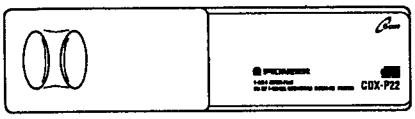
PIONEER
The Art of Entertainment

Service Manual



ORDER NO.
CRT1633

MULTI-COMPACT DISC PLAYER

CDX-P22

EW

COMPACT
disc
DIGITAL AUDIO

- **This additional service manual is designed to be used together with Model CDX-P610/EW Service Manual CRT1632. Refer to it for finding parts numbers and adjustment ,etc. which are not shown in this manual.**

EXPLODED VIEW PARTS LIST

- **Parts List (Page 1-39)**

Mark	No.	Description	CDX-P610/EW Part No.	CDX-P22/EW Part No.
	5	Upper Case	CNB1886	CNB1872
	6	Lower Case	CNB1815	CNB1885
	8	Main Unit	CWX1721	CWX1762 (Serial No. 11001~) CWX1869 (Serial No. ~11000)
	9	Extension Unit	CWX1729	CWX1802
	15	Angle	CNB1874	CNB1765
	27	Button	CAC3982	CAC4130
	28	Door	CAT1624	CAT1641
	30	Grille	CNS3092	CNS3160

PACKING METHOD

- **Parts List (Page 2-8)**

*:Non spare part

Mark	No.	Description	CDX-P610/EW Part No.	CDX-P22/EW Part No.
	1-1	Polyethylene Bag	CEG1116	•••••
	1-2	Owner's Manual	CRD1776	•••••
		Owner's Manual	CRD1777	•••••
*	1-3	Warranty Card	CRY1071	•••••
	7	Carton	CHG2507	CHG2511
	8	Accessory Assy	CEA2019	CEA2020
	8-2	Angle(X2)	CNB1874	CNB1765
	9	Contain Box	CHL2507	CHL2511

PIONEER ELECTRONIC CORPORATION 4-1, Meguro 1-Chome, Meguro-ku, Tokyo 153, Japan
PIONEER ELECTRONICS SERVICE INC. P.O.Box 1760, Long Beach, California 90801 U.S.A.
PIONEER ELECTRONICS OF CANADA, INC. 300 Allstate Parkway Markham, Ontario L3R OP2 Canada
PIONEER ELECTRONIC [EUROPE] N.V. Haven 1087 Keetberglaan 1, 9120 Melsele, Belgium
PIONEER ELECTRONICS AUSTRALIA PTY.LTD. 178-184 Boundary Road, Braeside, Victoria 3195, Australia TEL:[03]580-9911
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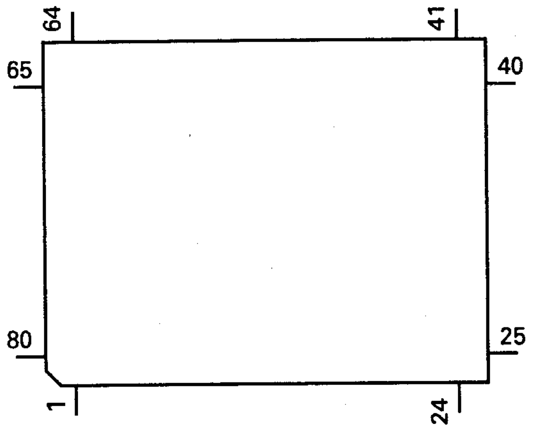
K-FFS.OCT.1994 Printed in Japan

● Pin Functions (PD5292A)

Pin No.	Pin Name	I/O	I/O Format	Function and Operation
1	$\overline{\text{TIN}}$	I	C	Disc sensor timing input
2	TEMP			Temperature detector
3	VDIN	I		Power supply short sensor input
4	$\overline{\text{CLAMP}}$	I	C	Tray position input
5	CSI	I	C	IP-BUS data input
6	CSO	O	C	IP-BUS data output
7	APPW	O	C	IP-BUS driver power supply control output
8	AO	O	C	Control signal distingshing from LSI
9	XSCK	I/O	C	LSI clock input/output
10	XSO	O	C	LSI data output
11	XSI	I	C	LSI data input
12	$\overline{\text{STB}}$	O	C	LSI Strobe output
13	$\overline{\text{RST}}$	O	C	LSI reset output
14	NC			Not used
15	DACRST	O	C	D/A converter reset output
16	$\overline{\text{ASENS}}$	I		ACC power sense input
17	$\overline{\text{BSENS}}$	I		Back up power sense input
18-23	NC			Not used
24	$\overline{\text{EJSW}}$	I		Eject key switch interrupt input
25	$\overline{\text{MAG}}$	I		Magazine lock switch interrupt input
26	NC			GND
27	$\overline{\text{RESET}}$	I		Reset input
28	POWER	O	C	CD +5V control
29	CONT	O	C	Servo driver power supply control
30	XIN	I		Crystal oscillating element connection pin
31	XOUT	O		Crystal oscillating element connection pin
32	VSS			GND
33-56	NC			Not used
57	$\overline{\text{EJP}}$	I	C	Reset position switch
58,59	NC			Not used
60	MIRR	I	C	Mirror detector input
61	LOCK	I	C	Spindle lock detector input
62	FOK	I	C	FOK signal input
63	$\overline{\text{HOME}}$	I	C	Home position detector input
64	OPTSW	I	C	Digital output ON/OFF input
65	LOAD	O	C	Mechanism power supply control
66	I3	O	C	Motor driver control output
67	I1	O	C	Motor driver control output
68	I2	O	C	Motor driver control output
69	I4	O	C	Motor driver control output
70	CDMUTE	O	C	CD mute output
71	$\overline{\text{ADENA}}$	O	C	A/D reference voltage output
72	$\overline{\text{TESTIN}}$	I	C	Test program mode input
73	VCC			Back up 5V
74	VREF	I		A/D converter reference voltage input
75	AVSS	I		A/D GND
76	UNIT			Not used
77	6/12	I	C	6/12 switching input
78	$\overline{\text{DISK}}$	I		Disc detector input
79	$\overline{\text{TSEL}}$			Tray position detector photo sensor
80	NC			Not used

I/O Format	Meaning
C	C MOS output

*PD5292A



IC's marked by are MOS type.*
Be careful in handing them because they are very liable to be damaged by electrostatic induction.

ELECTRICAL PARTS LIST

NOTE:

- Parts whose parts numbers are omitted are subject to being not supplied.
- The part numbers shown below indicate chip components.

  Chip Resistor

  RS1/○S○○○J,RS1/○○S○○○J

  Chip Capacitor (except for CQS.....)

  CKS....., CCS....., CSZS.....

=====Circuit Symbol & No. Part Name===== Part No.

Unit Number :
Unit Name : Extension P.C.Board

MISCELLANEOUS

Q 1693 1697		DTA144ES
Q 1696		DTC114YS
Q 1698 1699		DTC343TS
Q 1799		2SC2458
Q 1906		2SB942
Q 1907 1908		2SD1859
D 1698 1699		1SS133
D 1798 1799		RD18JSB1
D 1901 1903		ERA15-02VH
L 1901	Choke Coil	CTH1129

RESISTORS

R 1695 1910	RD1/4PS103JL
R 1696 1697	RD1/4PS332JL
R 1698 1699	RD1/4PS112JL
R 1795 1796 1908	RD1/4PS101JL
R 1798	RD1/4PS273JL
R 1799	RD1/4PS433JL
R 1906	RD1/4PS104JL
R 1907	RD1/4PS204JL
R 1909 1911	RD1/4PS201JL
R 1912	RD1/4PS241JL
R 1913	RD1/4PS681JL
R 1914	RD1/4PS511JL
R 1915	RD1/4PS104JL

CAPACITORS

C 1698 1699		CEA330M10LL
C 1798 1799		CKPYB471K50L
C 1901 1905	470 μF/16V	CCH1183
C 1904		CEA220M10LL
C 1906	470 μF/16V	CCH1183
C 1907		CKPYB102K50L

Unit Number : CWX1762 (Serial No. 11001~)
Unit Name : Main Unit

MISCELLANEOUS

IC 1001		UPC2571GS
IC 1201		UPD63700GF
IC 1401		XRA6797FP
IC 1601		SM5874AM
IC 1602		XRA4560F
IC 1603		NJM78L05A
IC 1701		PD5292A
IC 1703		PA0051AM
IC 1704		PAJ002A
IC 1801		LB1836M
Q 1001		2SA1015
Q 1401 1709		2SB1238
Q 1701		DTA144ES
Q 1703		DTC144ES
Q 1704 1707 1801		DTA123JS
Q 1708 1802		DTC114YS
D 1401 1402 1403		ERA15-02VH
X 1601	Resonator 16.9340MHz	CSS1328
X 1701	Ceramic Resonator	CSS1310
S 1701 1702	Switch(EJECT,RESET)	CSG1059
VR1001	Semi-fixed 2.2kΩ (B)	CCP1177
VR1002	Semi-fixed 22kΩ (B)	CCP1183
VR10031004	Semi-fixed 47kΩ (B)	CCP1185

=====Circuit Symbol & No. Part Name===== Part No.

RESISTORS

R 1001	RD1/4PS220JL
R 1002	RD1/4PS0R0JL
R 1003	RD1/4PS103JL
R 1004 1768	RS1/16S102J
R 1005	RS1/16S823J
R 1006	RS1/16S182J
R 1007	RS1/16S333J
R 1011 1012	RS1/16S683J
R 1013 1024 1025	RD1/4PS102JL
R 1014 1410	RS1/16S473J
R 1018	RD1/4PS622JL
R 1019 1401 1407 1716	RS1/16S563J
R 1020	RS1/16S622J
R 1021 1701	RS1/16S513J
R 1022 1408	RS1/16S133J
R 1027	RS1/16S183J
R 1028	RS1/16S822J
R 1201 1406 1411 1605 1606 1607 1608 1702 1712 1741	RS1/16S103J
R 1402 1403 1613 1614 1615 1616	RS1/16S163J
R 1404	RS1/16S753J
R 1405 1708	RS1/16S433J
R 1409	RS1/16S153J
R 1412	RS1/16S152J
R 1601	RS1/16S0R0J
R 1602	RS1/16S471J
R 1609 1610 1611 1612	RS1/16S752J
R 1617 1618 1769	RS1/16S101J
R 1619	RS1/16S102J
R 1703 1704	RS1/16S154J
R 1705 1713 1715 1718 1721 1730 1731 1732 1733 1734	RS1/16S104J
R 1706	RS1/16S104J
R 1709 1710 1714 1722 1729 1735 1744 1745	RS1/16S222J
R 1717	RS1/16S123J
R 1719 1742	RS1/16S0R0J
R 1747 1748	RS1/16S104J
R 1756	RS1/16S104J
R 1767	RD1/4PS3R9JL
R 1771	RS1/16S102J
R 1801 1802	RD1/4PS391JL

CAPACITORS

C 1001 1008 1010 1011 1708 1709	CKSRYB102K50
C 1002	CEA101M6R3LL
C 1003 1021 1602 1603 1604 1605	CKSQYB104K16
C 1004	CEA470M6R3LL
C 1005	CCSRCH101J50
C 1006 1023	CKSRYB561K50
C 1007	CKSYB334K16
C 1009	CCSRCH181J50
C 1013 1701 1705 1707	CKSRYB103K25
C 1014	CCSRCH220J50
C 1015 1201 1202	CKSYF105Z16
C 1018	CEA220M6R3LL
C 1022	CKSRYB332K50
C 1026	CKSRYB103K25
C 1203	CKSRYB471K50
C 1401	CSZA220M10
C 1402	CKSQYB103K50
C 1403	CKSQYB153K50
C 1404 1405	CEAS221M10
C 1406 1407	CKSRYB152K50
C 1408	CKSRYB271K50
C 1606 1607	CCSRCH470J50
C 1608	CEA101M6R3LL
C 1609 1610	CCSRCH221J50
C 1611 1612 1613 1614	CCSRCH680J50

=====Circuit Symbol & No. Part Name===== Part No.

C 1616	CKSYB224K16
C 1617 1618	CKSRYB103K25
C 1703	CASA330M10
C 1706	CKSRYB103K50
C 1710	CKSRYB103K25
C 1802	CEA220M16LL

Unit Number :
Unit Name : P.C.Board

C 801 802	CKSQYB102K50

Unit Number :
Unit Name : Mechanism P.C.Board

D 802	LED	BR4361F
S 805	Switch(Home)	CSN1012

Unit Number :
Unit Name : Photo P.C.Board

D 801	LED	BR4361F
S 801	Switch(RSTP)	CSN1025
S 802	Switch(MAG)	CSN1012

Miscellaneous Parts List

	PU Unit	CGY1036
M 802	Motor Unit(ELV)	CXA6978
M 803	Motor Unit(Tray)	CXA6977
M 801	Motor Unit(Spindle)	CXA6991
M 804	Motor Unit(Carriage)	CXA4649
P 801 802	Photo-Transistor	PT4800
S 803 804	Switch(TRP,DSP)	CSN1012

Unit Number : CWX1869(Serial No.~11000)
Unit Name : Main Unit

MISCELLANEOUS

IC 1001		UPC2571GS
IC 1201		UPD63700GF1
IC 1401		XRA6797FP
IC 1601		SM5874AM
IC 1602		XRA4560F
IC 1603		NJM78L05A
IC 1701		PD5293A
IC 1702		LH5160HN-10L
IC 1703		PA0051AM
IC 1704		PAJ002A
IC 1801		LB1836M
Q 1001		2SA1015
Q 1401 1709		2SB1238
Q 1701		DTA144ES
Q 1703		DTC144ES
Q 1704 1707 1801		DTA123JS
Q 1708 1802		DTC114YS
D 1401 1402 1403		ERA15-02VH
D 1701 1702		1SS292
X 1601	Resonator 16.9340MHz	CSS1328
X 1701	Ceramic Resonator	CSS1310
S 1701 1702	Switch(EJECT,RESET)	CSG1059
VR1001	Semi-fixed 2.2kΩ (B)	CCP1177
VR1002	Semi-fixed 22kΩ (B)	CCP1183
VR10031004	Semi-fixed 47kΩ (B)	CCP1185

RESISTORS

R 1001	RD1/4PS220JL
R 1002	RD1/4PS0R0JL
R 1003	RD1/4PS103JL
R 1004 1768	RS1/16S102J
R 1005	RS1/16S823J

=====Circuit Symbol & No. Part Name===== Part No.

R 1006	RS1/16S182J
R 1007	RS1/16S333J
R 1011 1012	RS1/16S683J
R 1013 1024 1025	RD1/4PS102JL
R 1014 1410	RS1/16S473J
R 1018	RD1/4PS622JL
R 1019 1401 1407 1716	RS1/16S563J
R 1020	RS1/16S622J
R 1021 1701	RS1/16S513J
R 1022 1408	RS1/16S133J
R 1027	RS1/16S183J
R 1028	RS1/16S822J
R 1201 1406 1411 1605 1606 1607 1608 1702 1712 1741	RS1/16S103J
R 1402 1403 1613 1614 1615 1616	RS1/16S163J
R 1404	RS1/16S753J
R 1405 1708	RS1/16S433J
R 1409	RS1/16S153J
R 1412	RS1/16S152J
R 1601 1719 1742	RS1/16S0R0J
R 1602	RS1/16S471J
R 1609 1610 1611 1612	RS1/16S752J
R 1617 1618 1769	RS1/16S101J
R 1619	RS1/16S102J
R 1703	RS1/16S154J
R 1704	RS1/16S154J
R 1705 1706 1713 1715 1718 1721 1730 1731 1732 1733	RS1/16S104J
R 1709 1710 1714 1722 1729 1735 1744 1745	RS1/16S222J
R 1717	RS1/16S123J
R 1734 1737 1738 1739	RS1/16S104J
R 1747 1748	RS1/16S104J
R 1756	RS1/16S104J
R 1767	RD1/4PS3R9JL
R 1771	RS1/16S102J
R 1801 1802	RD1/4PS391JL

CAPACITORS

C 1001 1008 1010 1011 1708 1709	CKSRYB102K50
C 1002	CEA101M6R3LL
C 1003 1021 1602 1603 1604 1605	CKSQYB104K16
C 1004	CEA470M6R3LL
C 1005	CCSRCH101J50
C 1006 1023	CKSRYB561K50
C 1007	CKSYB334K16
C 1009	CCSRCH181J50
C 1013 1701 1702 1705 1707	CKSRYB103K25
C 1014	CCSRCH220J50
C 1015 1201 1202	CKSYF105Z16
C 1018	CEA220M6R3LL
C 1022	CKSRYB332K50
C 1026	CKSRYB103K25
C 1203	CKSRYB471K50
C 1401	CSZA220M10
C 1402	CKSQYB103K50
C 1403	CKSQYB153K50
C 1404 1405	CEAS221M10
C 1406 1407	CKSRYB152K50
C 1408	CKSRYB271K50
C 1606 1607	CCSRCH470J50
C 1608	CEA101M6R3LL
C 1609 1610	CCSRCH221J50
C 1611 1612 1613 1614	CCSRCH680J50
C 1616	CKSYB224K16
C 1617 1618	CKSRYB103K25
C 1703	CASA330M10
C 1704	CEA221M6R3LL
C 1706	CKSRYB103K50
C 1710	CKSRYB103K25
C 1802	CEA220M16LL

CONNECTION DIAGRAM(1)

PU UNIT

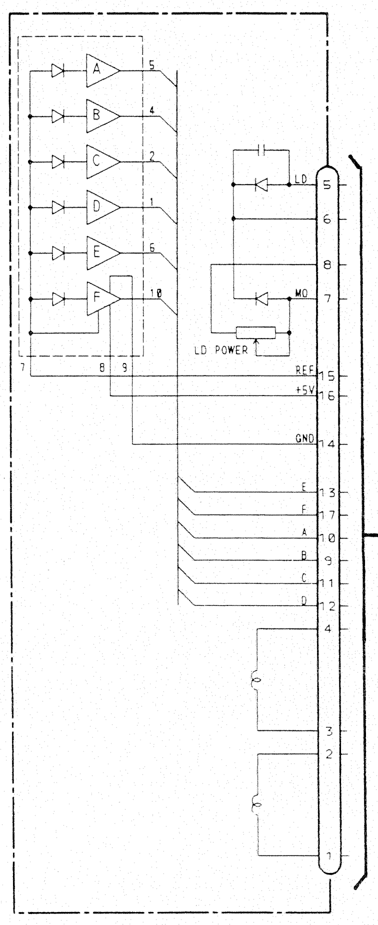
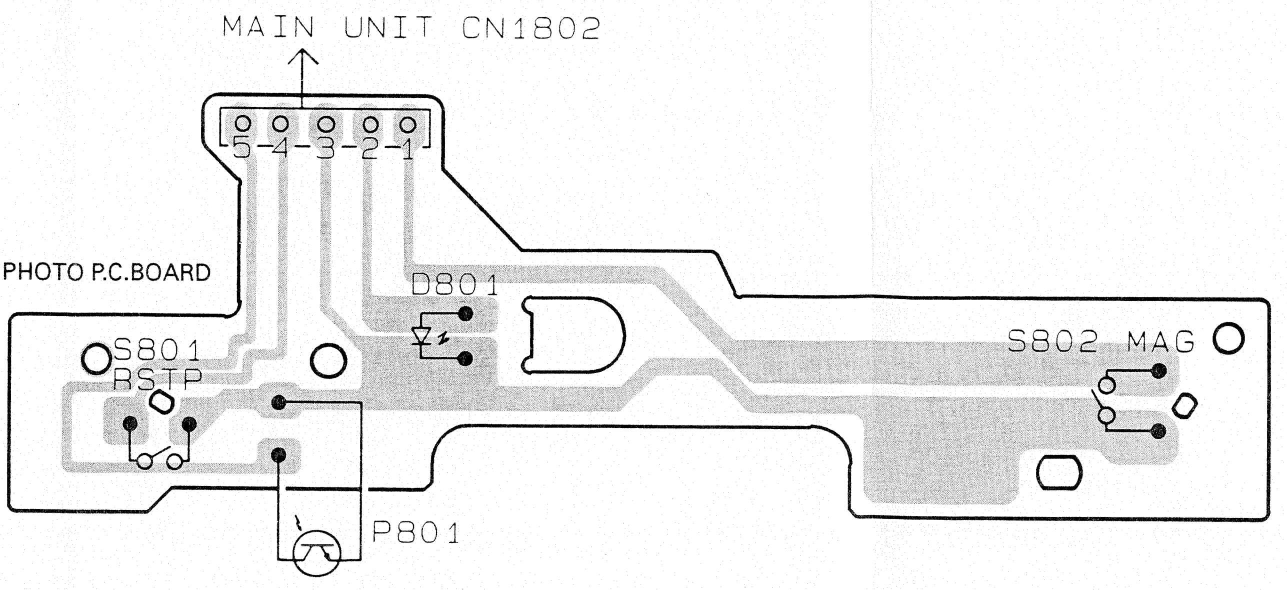
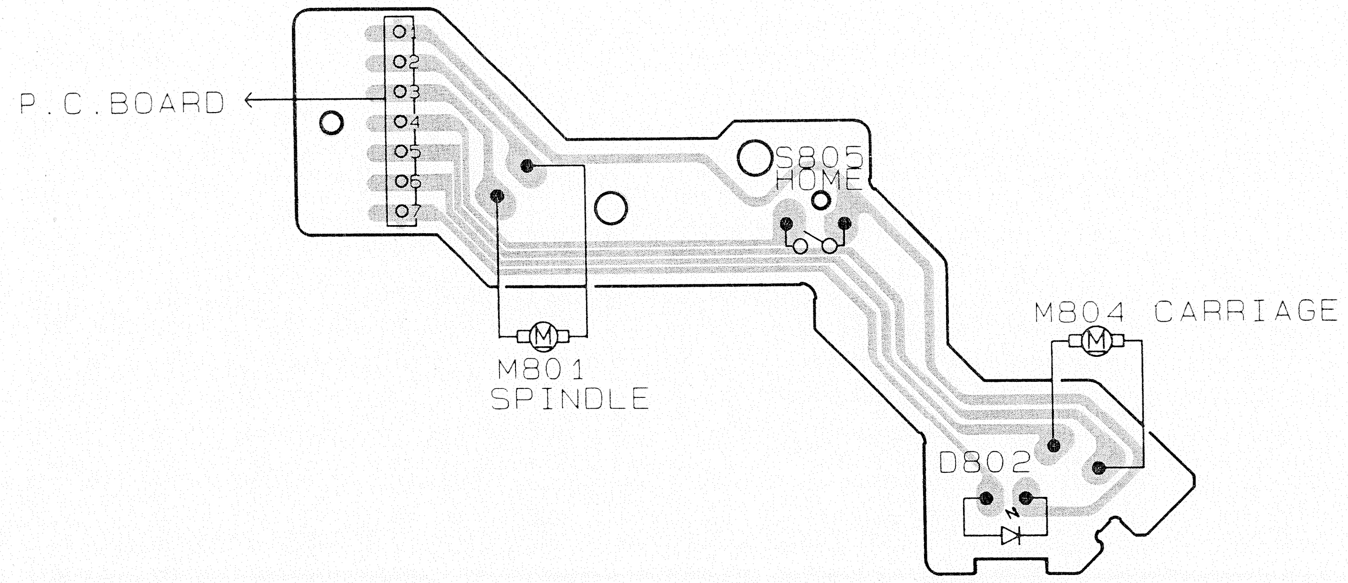

A
B
C
D
E
F
LD
MD
LD POWER
REF
+5V
GND
P.C. BOARD

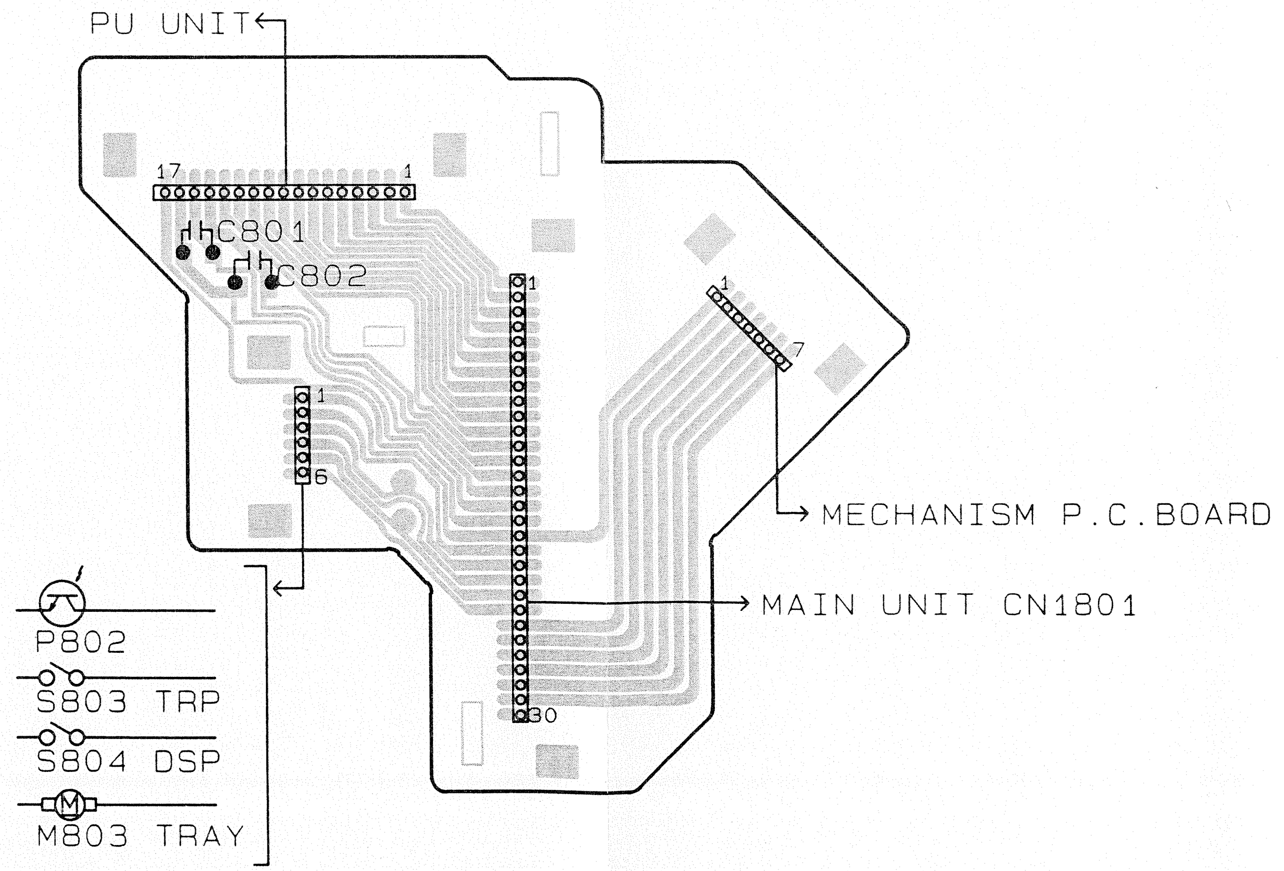
PHOTO P.C.BOARD


MAIN UNIT CN1802
5 4 3 2 1
D801
S801
RSTP
S802 MAG
P801

MECHANISM P.C.BOARD


P.C.BOARD
1
2
3
4
5
6
7
S805
HOME
M801
SPINDLE
M804 CARRIAGE
D802

P.C.BOARD


PU UNIT
17
1
C801
C802
1
1
7
1
6
30
MECHANISM P.C.BOARD
MAIN UNIT CN1801
P802
S803 TRP
S804 DSP
M803 TRAY

SM P.C.BOARD

CN1801

IC, Q	ADJ
IC1801 Q1801 Q1802	VR1001 VR1002 VR1003 VR1004
Q1701 IC1001	
IC1201 IC1701	
Q1001	
IC1703	
IC1601 IC1603 Q1703	
Q1708 Q1704	
Q1707	
IC1401 Q1709 IC1602	
IC1704	
Q1401	

MAIN UNIT (Serial No. 11001~)

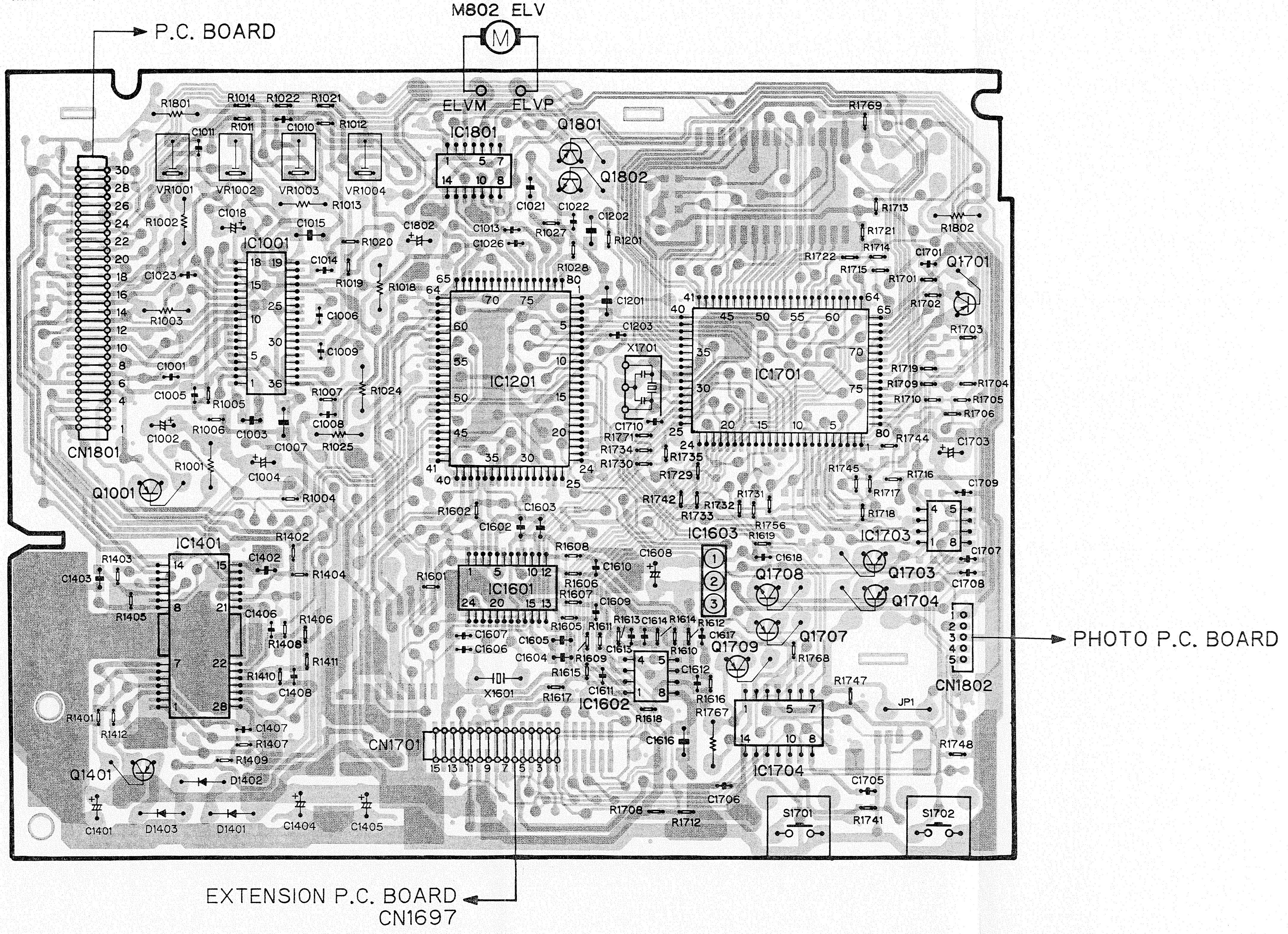
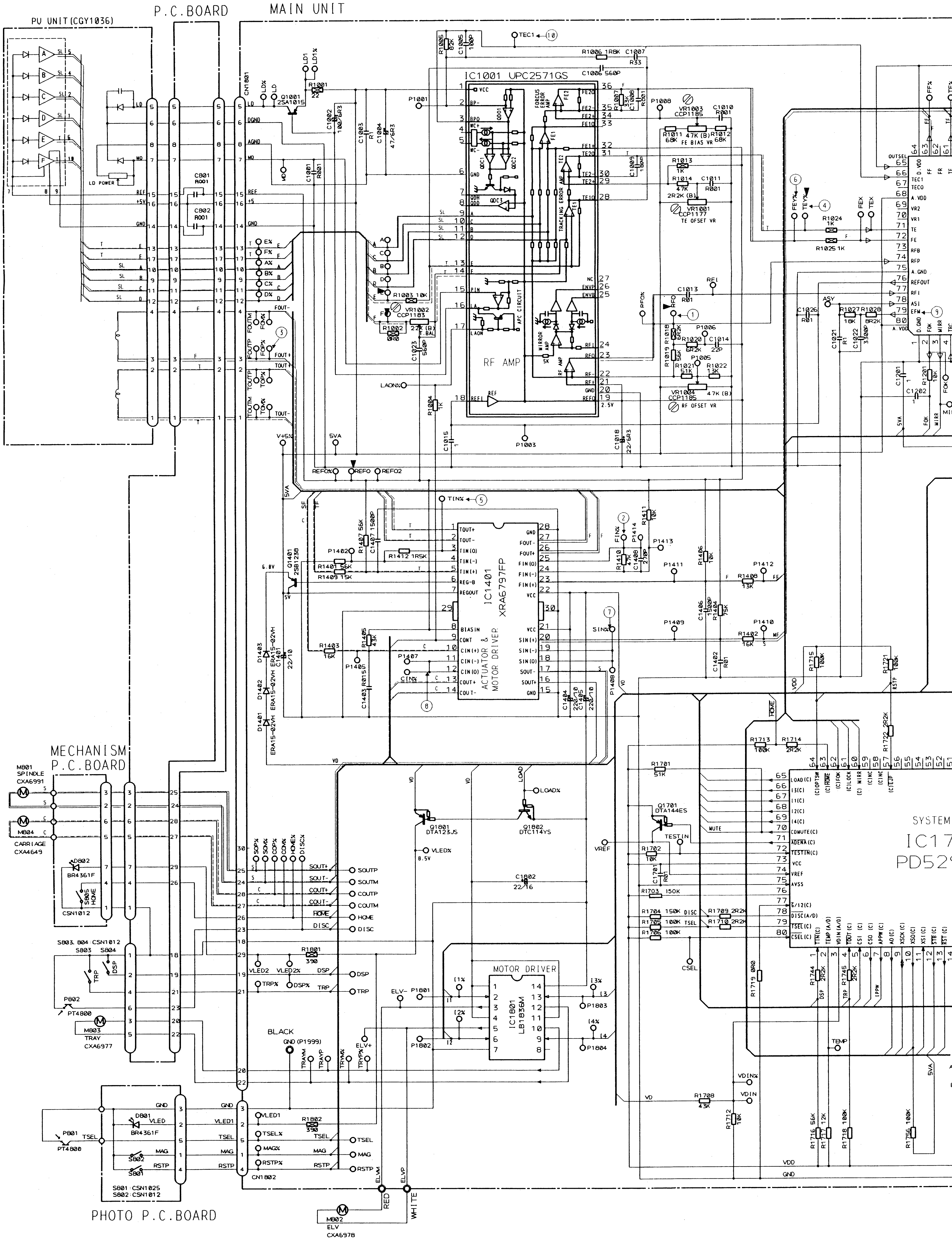
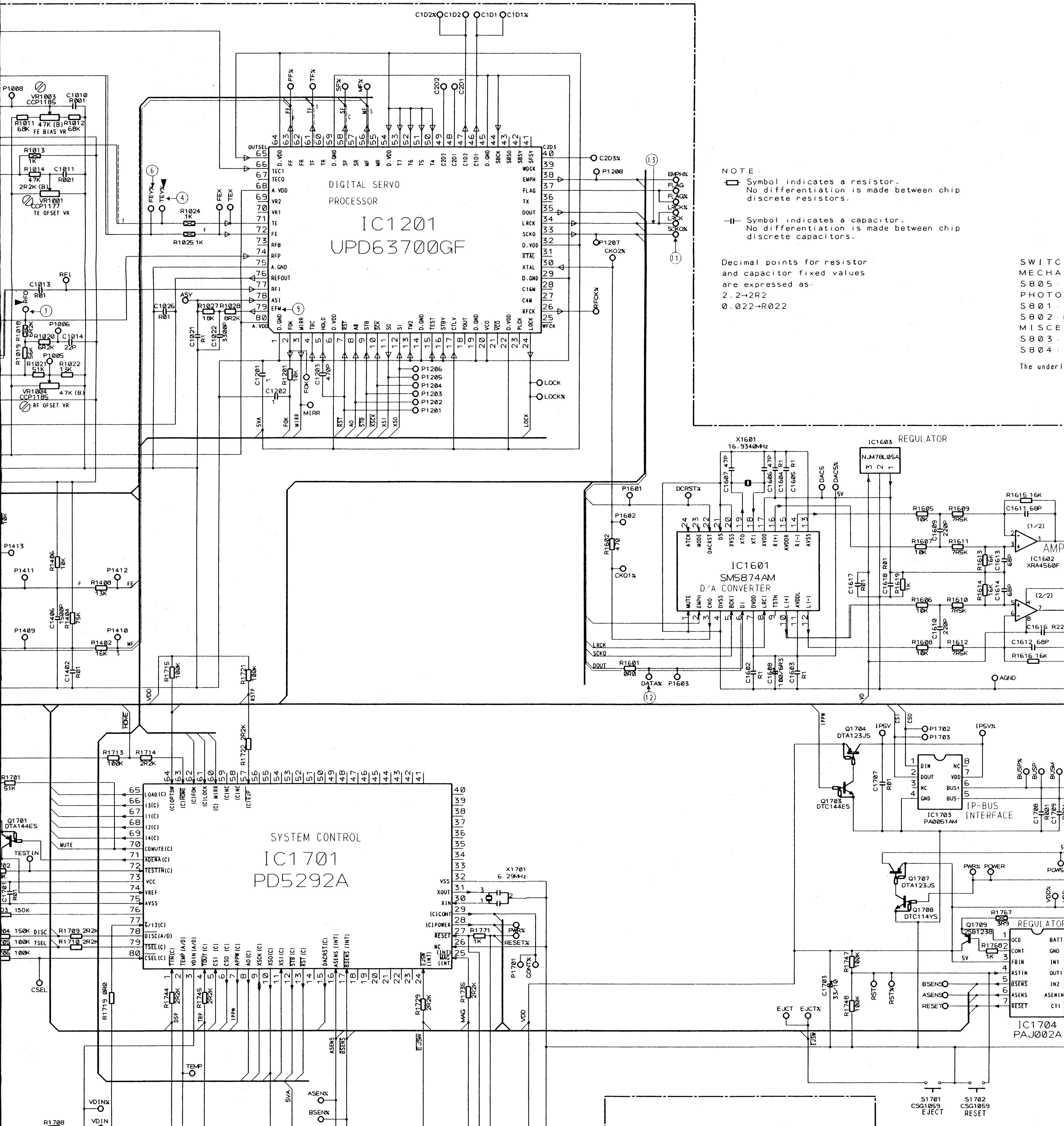

P.C. BOARD
M802 ELV
ELVM
ELVP
IC1801
Q1801
Q1802
VR1001
VR1002
VR1003
VR1004
CN1801
IC1001
IC1201
IC1701
X1701
Q1701
Q1001
IC1401
Q1401
IC1601
IC1602
IC1603
IC1703
IC1704
Q1703
Q1704
Q1707
Q1708
Q1709
X1601
CN1701
CN1802
JP1
S1701
S1702
D1401
D1402
D1403
PHOTO P.C. BOARD
EXTENSION P.C. BOARD
CN1697

Fig.1

SCHEMATIC CIRCUIT DIAGRAM(1)

SL SIGNAL LINE
F FOCUS SERVO LINE
T TRACKING SERVO LINE
C CARRIAGE SERVO LINE
S SPINDLE SERVO LINE


PU UNIT(CGY1036)
P.C.BOARD
MAIN UNIT
IC1001 UPC2571GS
RF AMP
FOCUS ERROR AMP
TRACKING ERROR AMP
APC CIRCUIT
MIRROR AMP
VR1003 CCP1185 FE BIAS VR
VR1001 CCP1177 TE OFSET VR
VR1004 CCP1185 RF OFSET VR
VR1002 CCP1183 T.BAL
Q1001 2SA1015
IC1401 XRA6797FP
ACTUATOR & MOTOR DRIVER
Q1401 2SB1238
D1401 ERA15-02VH
D1402 ERA15-02VH
D1403 ERA15-02VH
MECHANISM P.C.BOARD
M801 SPINDLE CXA6991
M804 CARRIAGE CXA4649
D802 BR4361F
S805 HOME
CSN1012
S803, 804 CSN1012
P802 PT4800
M803 TRAY CXA6977
Q1801 DTA123JS
Q1802 DTC114YS
MOTOR DRIVER
IC1801 LB1836M
BLACK
GND (P1999)
PHOTO P.C.BOARD
D801 BR4361F
P801 PT4800
S801 CSN1025
S802 CSN1012
CN1802
M802 ELV CXA6978
RED
WHITE
Q1701 DTA144ES
SYSTEM
IC17
PD52
1
2
3
4


C1D2% C1D2 C1D1 C1D1%
DIGITAL SERVO PROCESSOR
IC1201
UPD63700GF
FF% TF% SF% MF%
C2D2 C2D1
C2D3%
P1208
EMPH% FLAG FLAG% LRCK% SCKO%
P1207
CKO2%
RFCK%
LOCK
LOCK%
P1206 P1205 P1204 P1203 P1202 P1201
MIRR
P1008
VR1003 CCP1185
FE BIAS VR
VR1001 CCP1177
TE OFSET VR
VR1004 CCP1185
RF OFSET VR
FEY% TEY% FEX TEX
R1024 1K
R1025 1K
REI
RFO
ASY
P1006 P1005
P1413 P1411 P1412 P1409 P1410
X1601 16.9340MHz
IC1603 REGULATOR
NJM78L05A
P1601 P1602
DCRST%
DACS DACS%
IC1601
SM5874AM
D/A CONVERTER
CKO1%
DATA% P1603
AGND
AMP
IC1602 XRA4560F
R1615 16K
C1611 68P
R1616 16K
C1612 68P
SYSTEM CONTROL
IC1701
PD5292A
X1701 6.29MHz
PWR% RESET%
P1701 CONT%
Q1701 DTA144ES
TESTIN
MUTE
CSEL
DSP TRP IPPW
TEMP
5VA
ASEN% BSEN%
VDIN% VDIN
R1708 43K
Q1704 DTA123JS
Q1703 DTC144ES
IPSV P1702 P1703 IPSV%
IC1703 PA0051AM
IP-BUS INTERFACE
BUSP% BUSP BUSM
Q1707 DTA123JS
Q1708 DTC114YS
PWR% POWER
Q1709 2SB1238
REGULATOR
IC1704
PAJ002A
RST RST%
EJCT EJCT%
BSENS ASENS RESET
S1701 CSG1059 EJECT
S1702 CSG1059 RESET
VDD
GND
⑥ ④ ① ⑨ ⑬ ⑪ ⑫

NOTE.

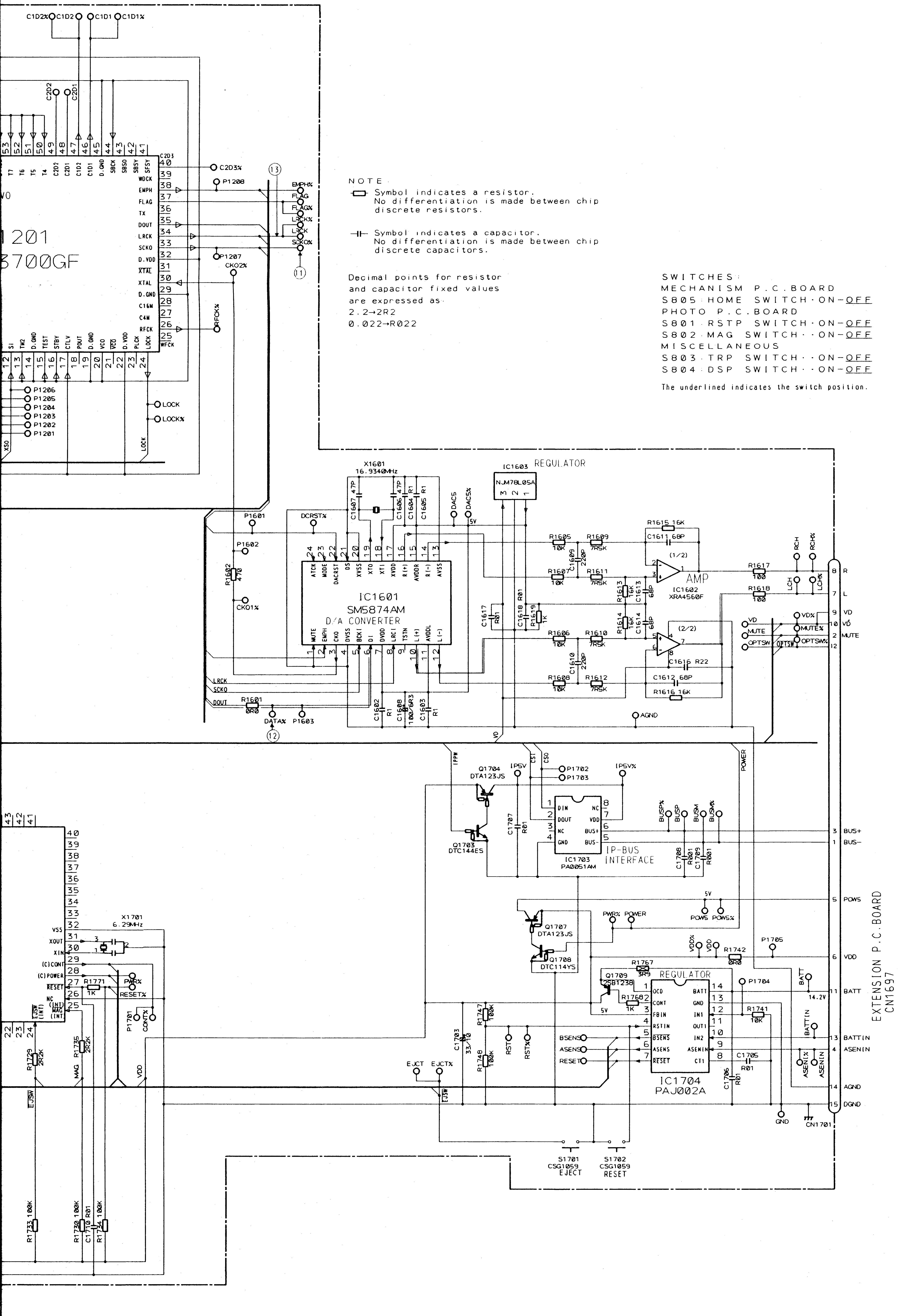
Symbol indicates a resistor.
No differentiation is made between chip
discrete resistors.

Symbol indicates a capacitor.
No differentiation is made between chip
discrete capacitors.

Decimal points for resistor
and capacitor fixed values
are expressed as.
2.2→2R2
0.022→R022

SWITC
MECHA
S805
PHOTO
S801
S802
MISCE
S803
S804

The underl


C1D2% C1D2 C1D1 C1D1%
C2D2
C2D1
C2D3%
P1208
EMPH%
FLAG
FLAG%
LRCK%
LRCK
SCKO%
P1207
CKO2%
RFCK%
1201
3700GF
P1206
P1205
P1204
P1203
P1202
P1201
LOCK
LOCK%
X1601 16.9340MHz
IC1603 REGULATOR NJM78L05A
P1601
DCRST%
DAC5
DAC5%
P1602
R1602 470
CKO1%
IC1601 SM5874AM D/A CONVERTER
R1601 0R0
DATA%
P1603
AGND
R1615 16K
C1611 68P
R1605 10K
R1609 7R5K
R1607 10K
R1611 7R5K
AMP
IC1602 XRA4560F
R1617 100
R1618 100
RCH
RCH%
LCH
LCH%
VD%
MUTE%
OPTSW%
R1606 10K
R1610 7R5K
R1608 10K
R1612 7R5K
C1616 R22
C1612 68P
R1616 16K
Q1704 DTA123JS
Q1703 DTC144ES
IPSV
P1702
P1703
IPSV%
IC1703 PA0051AM
IP-BUS INTERFACE
BUSP%
BUSP
BUSM
BUSM%
POWER
PWR%
POWS
POWS%
Q1707 DTA123JS
Q1708 DTC114YS
X1701 6.29MHz
R1771 1K
PWR%
RESET%
P1701
CONT%
R1742 0R0
P1705
R1767 3R9
Q1709 2SB1238
REGULATOR
P1704
R1768 1K
R1741 10K
BATT
14.2V
BATTIN
ASENIN%
ASENIN
R1747 100K
R1748 100K
C1703 33/10
RST
RST%
BSENS
ASENS
RESET
EJCT
EJCT%
IC1704 PAJ002A
C1705 R01
GND
CN1701
S1701 CSG1059 EJECT
S1702 CSG1059 RESET
R1729 2R2K
R1735 2R2K
R1733 100K
R1730 100K
C1710 R01
R1734 100K
BUS+
BUS-
POWS
VDD
BATT
BATTIN
ASENIN
AGND
DGND
EXTENSION P.C.BOARD CN1697
A
B
C
D
E
F
6
7
8
9

NOTE:

▭ Symbol indicates a resistor.
No differentiation is made between chip discrete resistors.

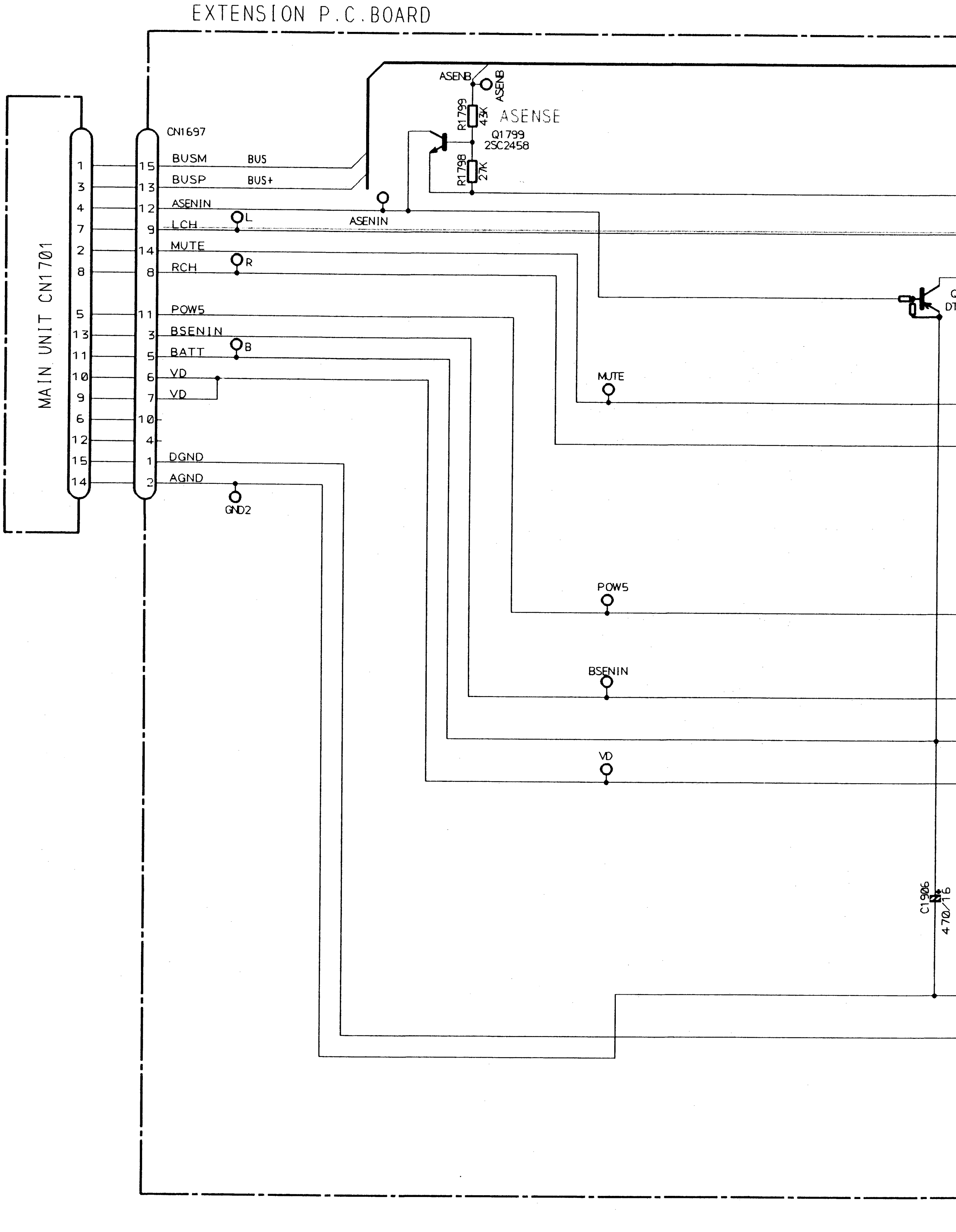
⊣⊢ Symbol indicates a capacitor.
No differentiation is made between chip discrete capacitors.

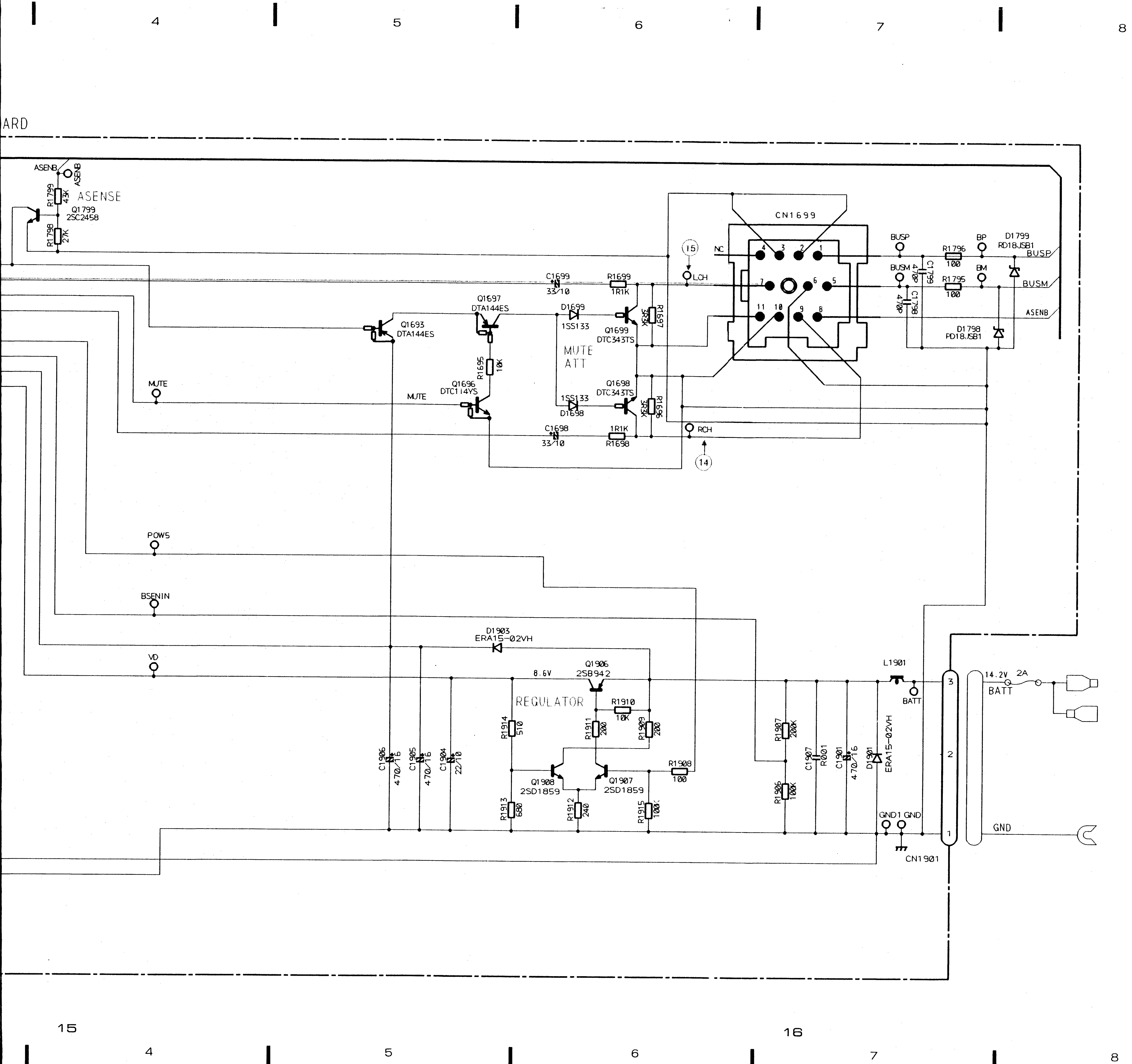
Decimal points for resistor and capacitor fixed values are expressed as:
2.2→2R2
0.022→R022

SWITCHES:
MECHANISM P.C.BOARD
S805:HOME SWITCH:ON-OFF
PHOTO P.C.BOARD
S801:RSTP SWITCH:ON-OFF
S802:MAG SWITCH::ON-OFF
MISCELLANEOUS
S803:TRP SWITCH::ON-OFF
S804:DSP SWITCH::ON-OFF
The underlined indicates the switch position.

Fig.2

SCHEMATIC CIRCUIT DIAGRAM(2)


EXTENSION P.C.BOARD
MAIN UNIT CN1701
CN1697
BUSM
BUS
BUSP
BUS+
ASENIN
LCH
MUTE
RCH
POW5
BSENIN
BATT
VD
VD
DGND
AGND
L
R
B
GND2
ASENB
ASENB
R1799
43K
ASENSE
Q1799
2SC2458
R1798
27K
ASENIN
MUTE
POW5
BSENIN
VD
C1906
470/16
1
3
4
7
2
8
5
13
11
10
9
6
12
15
14
15
13
12
9
14
8
11
3
5
6
7
10
4
1
2


4
5
6
7
8
ARD
ASENB
ASENB
R1799
43K
ASENSE
Q1799
2SC2458
R1798
27K
CN1699
NC
4
3
2
1
7
6
5
11
10
9
8
(15)
LCH
C1699
33/10
R1699
1R1K
Q1697
DTA144ES
Q1693
DTA144ES
D1699
1SS133
Q1699
DTC343TS
R1697
5R3K
R1695
10K
MUTE
ATT
MUTE
MUTE
Q1696
DTC114YS
Q1698
DTC343TS
1SS133
D1698
R1696
5R3K
C1698
33/10
1R1K
R1698
RCH
(14)
BUSP
BUSM
C1799
470P
C1798
470P
R1796
100
R1795
100
BP
BM
D1799
RD18JSB1
BUSP
BUSM
ASENB
D1798
PD18JSB1
POW5
BSENIN
D1903
ERA15-02VH
VD
8.6V
Q1906
2SB942
REGULATOR
R1910
10K
R1914
510
R1911
200
R1909
200
C1906
470/16
C1905
470/16
C1904
22/10
Q1908
2SD1859
Q1907
2SD1859
R1908
100
R1913
680
R1912
240
R1915
100K
R1907
200K
R1906
100K
C1907
R001
C1901
470/16
D1901
ERA15-02VH
L1901
BATT
3
2
1
14.2V
2A
BATT
GND1
GND
CN1901
GND
4
5
6
7
8

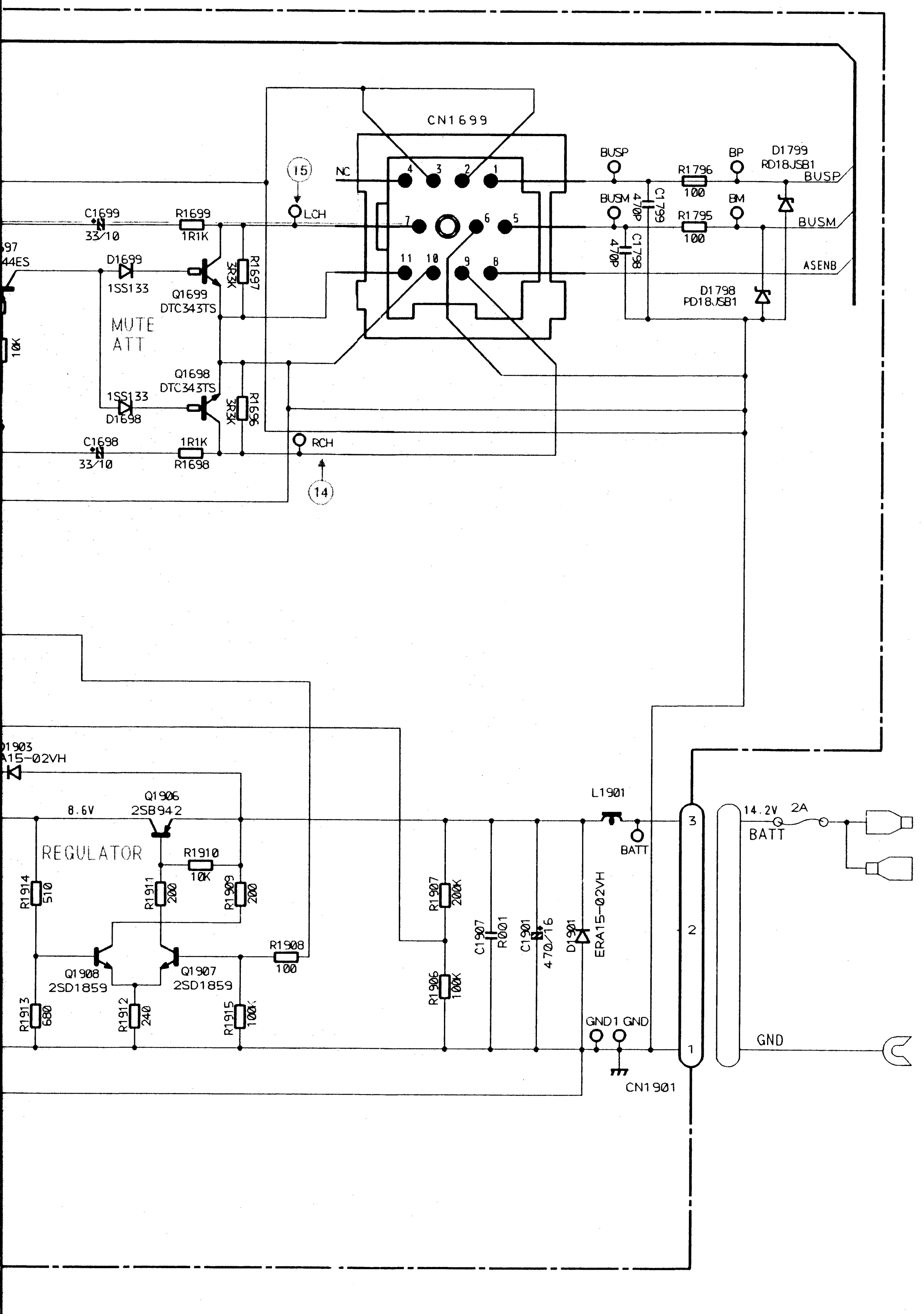

6
7
8
9
A
B
C
D
CN1699
NC
BUSP
BUSM
BP
BM
R1796
100
R1795
100
C1799
470P
C1798
470P
D1799
RD18JSB1
D1798
RD18JSB1
BUSP
BUSM
ASENB
15
LCH
14
RCH
C1699
33/10
R1699
1R1K
C1698
33/10
R1698
1R1K
D1699
1SS133
D1698
1SS133
Q1699
DTC343TS
Q1698
DTC343TS
R1697
3R3K
R1696
3R3K
MUTE
ATT
97
44ES
10K
D1903
A15-02VH
Q1906
2SB942
8.6V
REGULATOR
R1910
10K
R1914
510
R1911
200
R1909
200
Q1908
2SD1859
Q1907
2SD1859
R1908
100
R1913
680
R1912
240
R1915
100K
R1907
200K
R1906
100K
C1907
R001
C1901
470/16
D1901
ERA15-02VH
L1901
BATT
GND1
GND
CN1901
14.2V
2A
BATT
GND

Fig.3

CONNE CTION DIAGRAM(2)

A

B

C

D

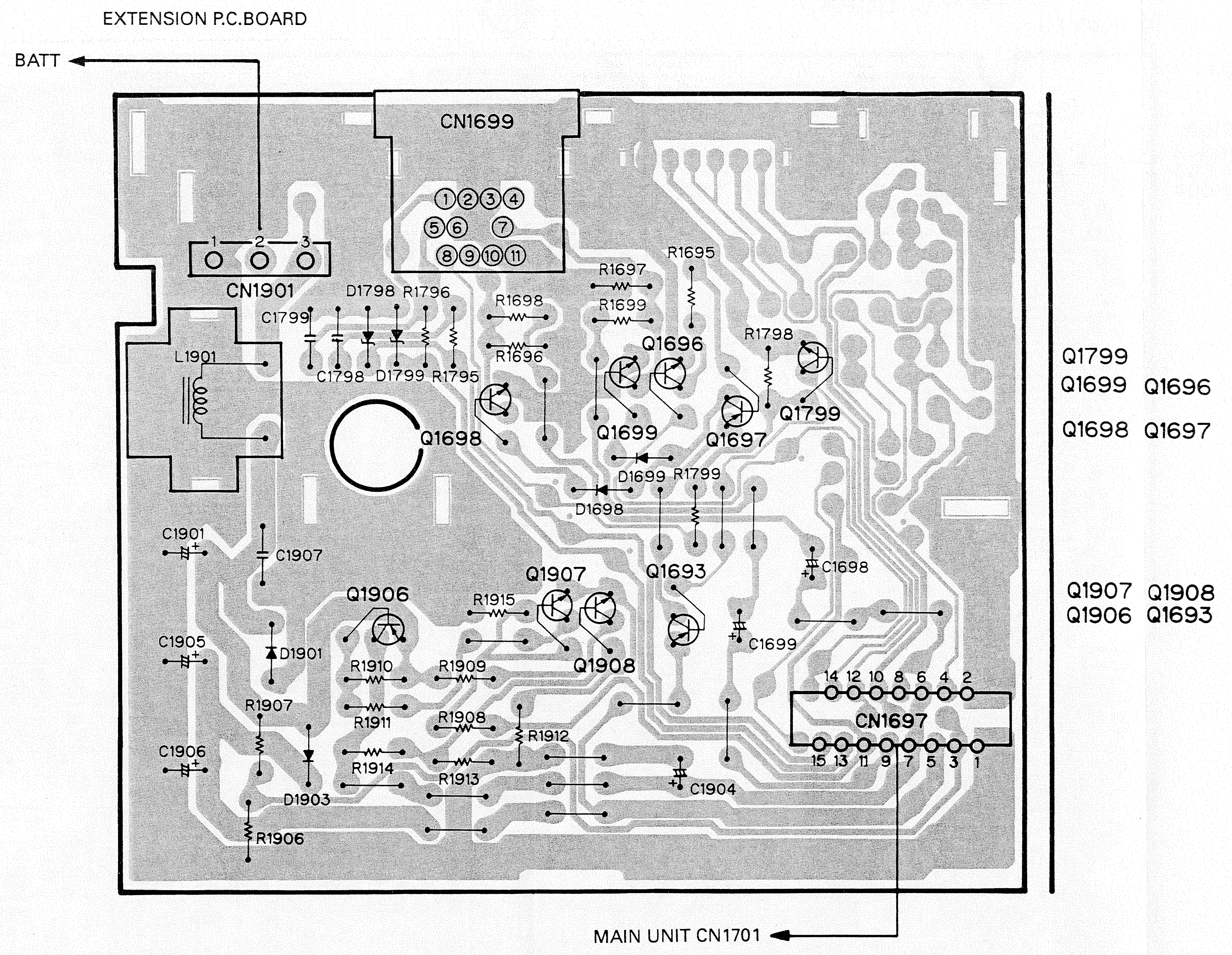

EXTENSION P.C.BOARD
BATT
CN1699
①②③④
⑤⑥ ⑦
⑧⑨⑩⑪
1 2 3
CN1901
D1798 R1796
C1799
C1798 D1799 R1795
L1901
R1698
R1696
R1697
R1699
R1695
Q1696
R1798
Q1698
Q1699
Q1697
Q1799
D1699 R1799
D1698
C1901
C1907
C1698
Q1906
Q1907
R1915
Q1693
C1905
D1901
R1910
R1909
Q1908
C1699
R1911
R1907
R1908
R1912
14 12 10 8 6 4 2
CN1697
15 13 11 9 7 5 3 1
C1906
R1914
R1913
C1904
D1903
R1906
MAIN UNIT CN1701
Q1799
Q1699 Q1696
Q1698 Q1697
Q1907 Q1908
Q1906 Q1693

Fig.4

MAIN UNIT (Serial No. ~11000)

IC, Q	ADJ
IC1801 Q1801 Q1802 IC1702	VR1001 VR1002 VR1003 VR1004
Q1701 IC1001	
IC1201 IC1701	
Q1001	
IC1703	
IC1601 IC1603 Q1703	
Q1708 Q1704	
Q1707	
IC1401 Q1709 IC1602	
IC1704	
Q1401	

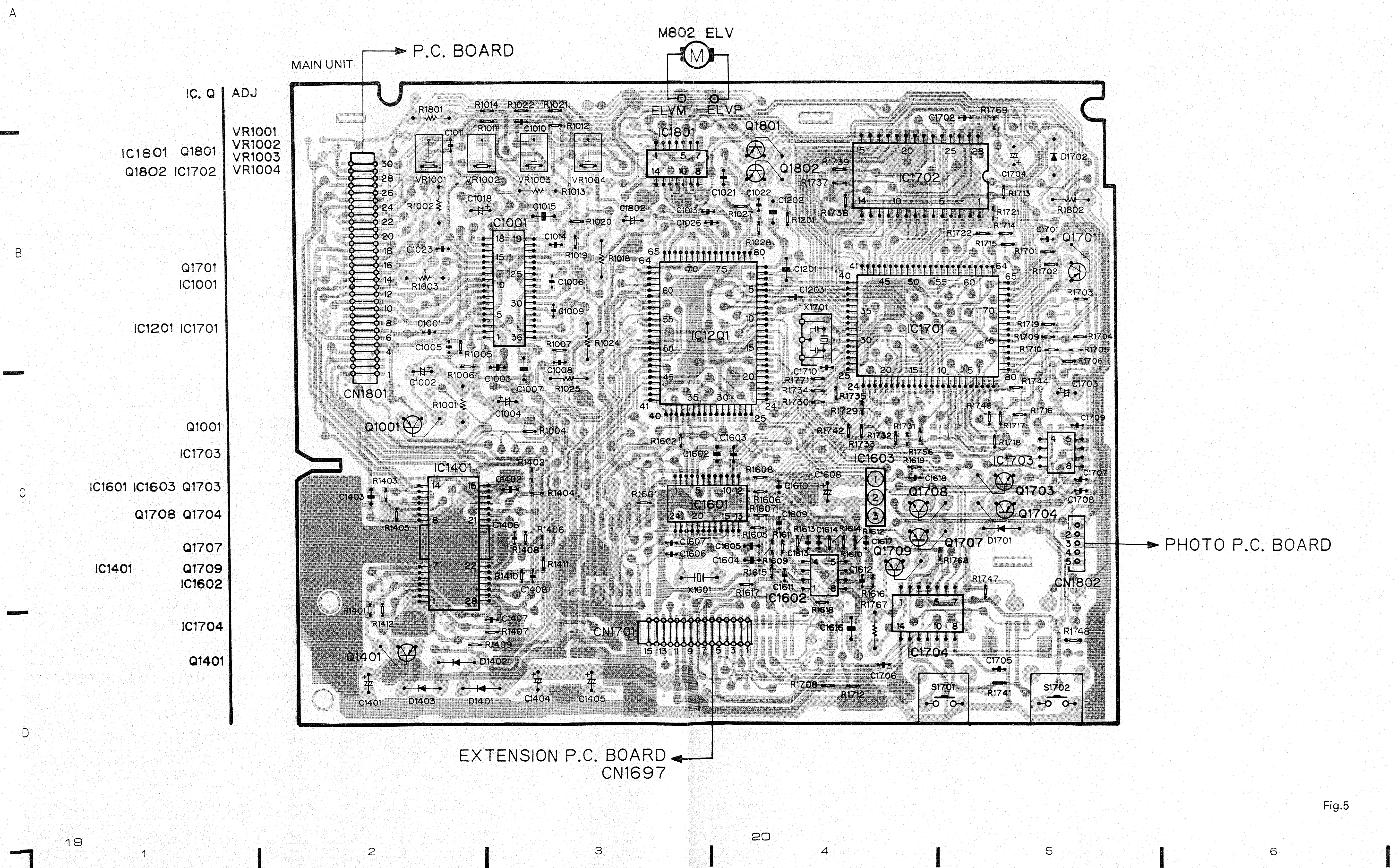
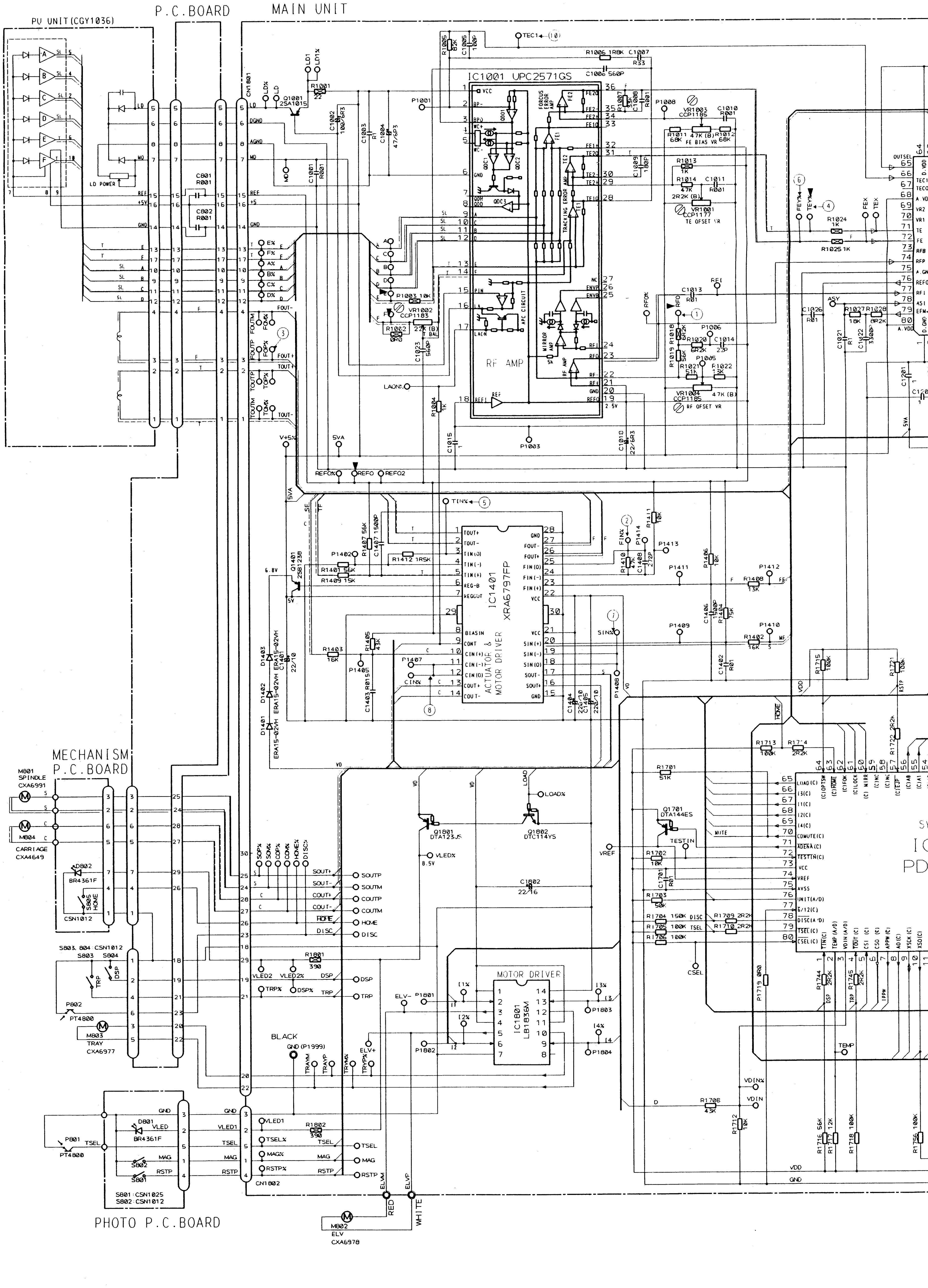

A
B
C
D
1
2
3
4
5
6
MAIN UNIT
P.C. BOARD
M802 ELV
M
ELVM
ELVP
CN1801
IC1801
Q1801
Q1802
IC1702
IC1001
IC1201
IC1701
VR1001
VR1002
VR1003
VR1004
X1701
Q1701
Q1001
IC1401
IC1601
IC1603
IC1602
IC1703
IC1704
Q1703
Q1704
Q1707
Q1708
Q1709
Q1401
X1601
D1401
D1402
D1403
D1701
D1702
CN1701
S1701
S1702
CN1802
PHOTO P.C. BOARD
EXTENSION P.C. BOARD
CN1697

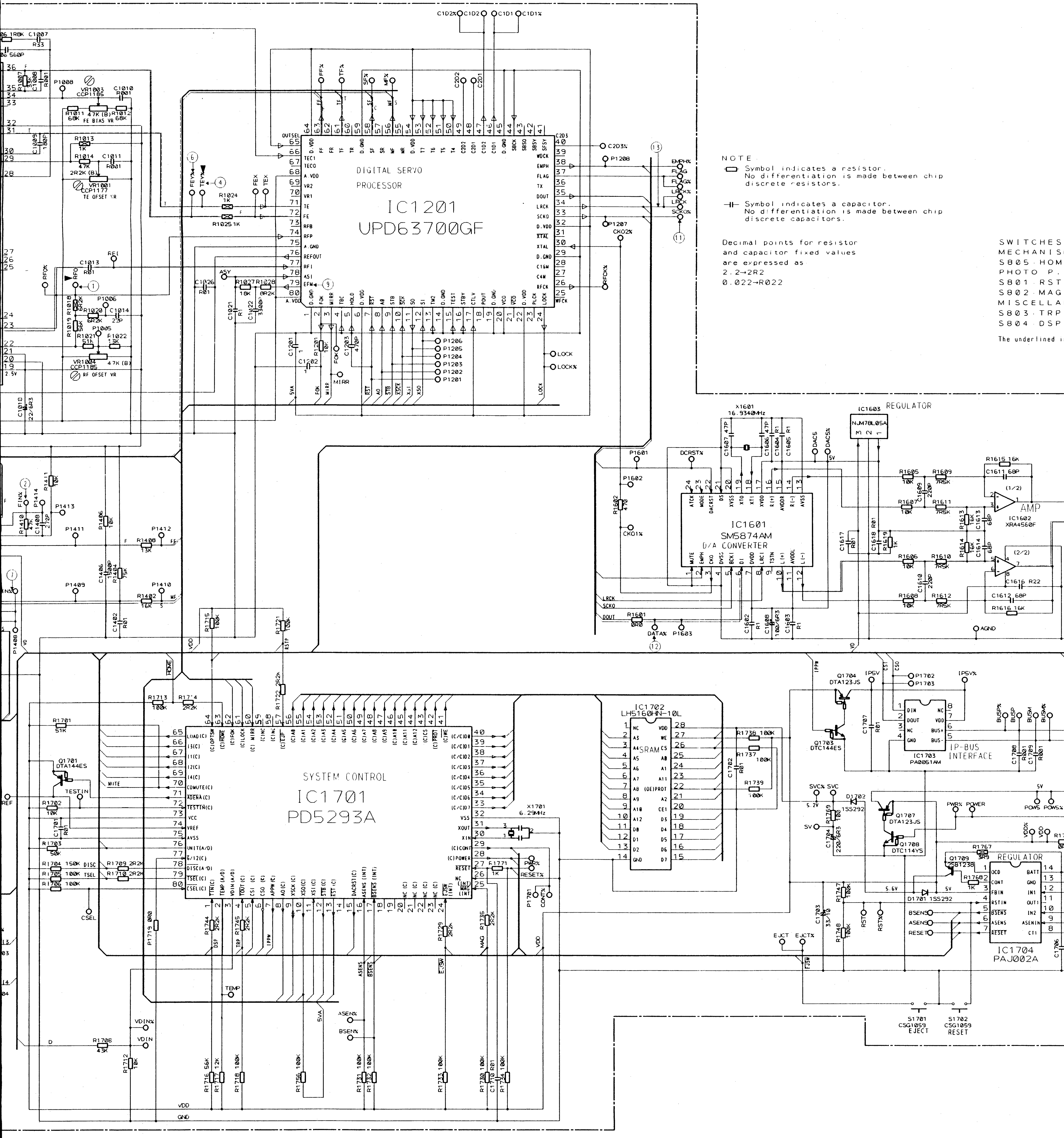
Fig.5

MAIN UNIT (Serial No. ~11000)

SL SIGNAL LINE
F FOCUS SERVO LINE
T TRACKING SERVO LINE
C CARRIAGE SERVO LINE
S SPINDLE SERVO LINE



PU UNIT(CGY1036)
P.C.BOARD
MAIN UNIT
LD POWER
CN1801
Q1001 2SA1015
IC1001 UPC2571GS
FOCUS ERROR AMP
TRACKING ERROR AMP
APC CIRCUIT
MIRROR AMP
RF AMP
VR1003 CCP1185 FE BIAS VR
VR1001 CCP1177 TE OFSET VR
VR1004 CCP1185 RF OFSET VR
VR1002 CCP1183 T BAL
LAON
REFOX REFO REFO2
IC1401 XRA6797FP
ACTUATOR & MOTOR DRIVER
Q1401 2SB1238
D1401 ERA15-02VH
D1402 ERA15-02VH
D1403 ERA15-02VH
MECHANISM P.C.BOARD
M801 SPINDLE CXA6991
M804 CARRIAGE CXA4649
D802 BR4361F
S805 HOME
CSN1012
S803, 804 CSN1012
S803 TRP
S804 DSP
P802 PT4800
M803 TRAY CXA6977
Q1801 DTA123JS
Q1802 DTC114YS
VLEDX 8.5V
MOTOR DRIVER
IC1801 LB1836M
BLACK
GND (P1999)
ELV- ELV+
TRAYM TRAYP
D801 BR4361F
P801 PT4800
S802 MAG
S801 RSTP
S801:CSN1025
S802:CSN1012
CN1802
PHOTO P.C.BOARD
M802 ELV CXA6978
RED WHITE
ELVM ELVP
Q1701 DTA144ES
TESTIN
VREF
CSEL
VDIN
TEMP
LOAD
SOUTP SOUTM COUTP COUTM HOME DISC
DSP TRP TSEL MAG RSTP
1 2 3 4


DIGITAL SERVO PROCESSOR
IC1201
UPD63700GF
IC1601
SM5874AM
D/A CONVERTER
IC1603
NJM78L05A
REGULATOR
X1601
16.9340MHz
AMP
IC1602
XR4560F
IC1702
LH5160HN-10L
SRAM
SYSTEM CONTROL
IC1701
PD5293A
X1701
6.29MHz
IC1703
PA0051AM
IP-BUS INTERFACE
IC1704
PAJ002A
REGULATOR
Q1701
DTA144ES
Q1703
DTC144ES
Q1704
DTA123JS
Q1707
DTA123JS
Q1708
DTC114YS
Q1709
2SB1238
VR1003
CCP1185
FE BIAS VR
VR1001
CCP1177
TE OFSET VR
VR1004
CCP1185
RF OFSET VR
S1701
CSG1059
EJECT
S1702
CSG1059
RESET
4
5
6
7
8

NOTE

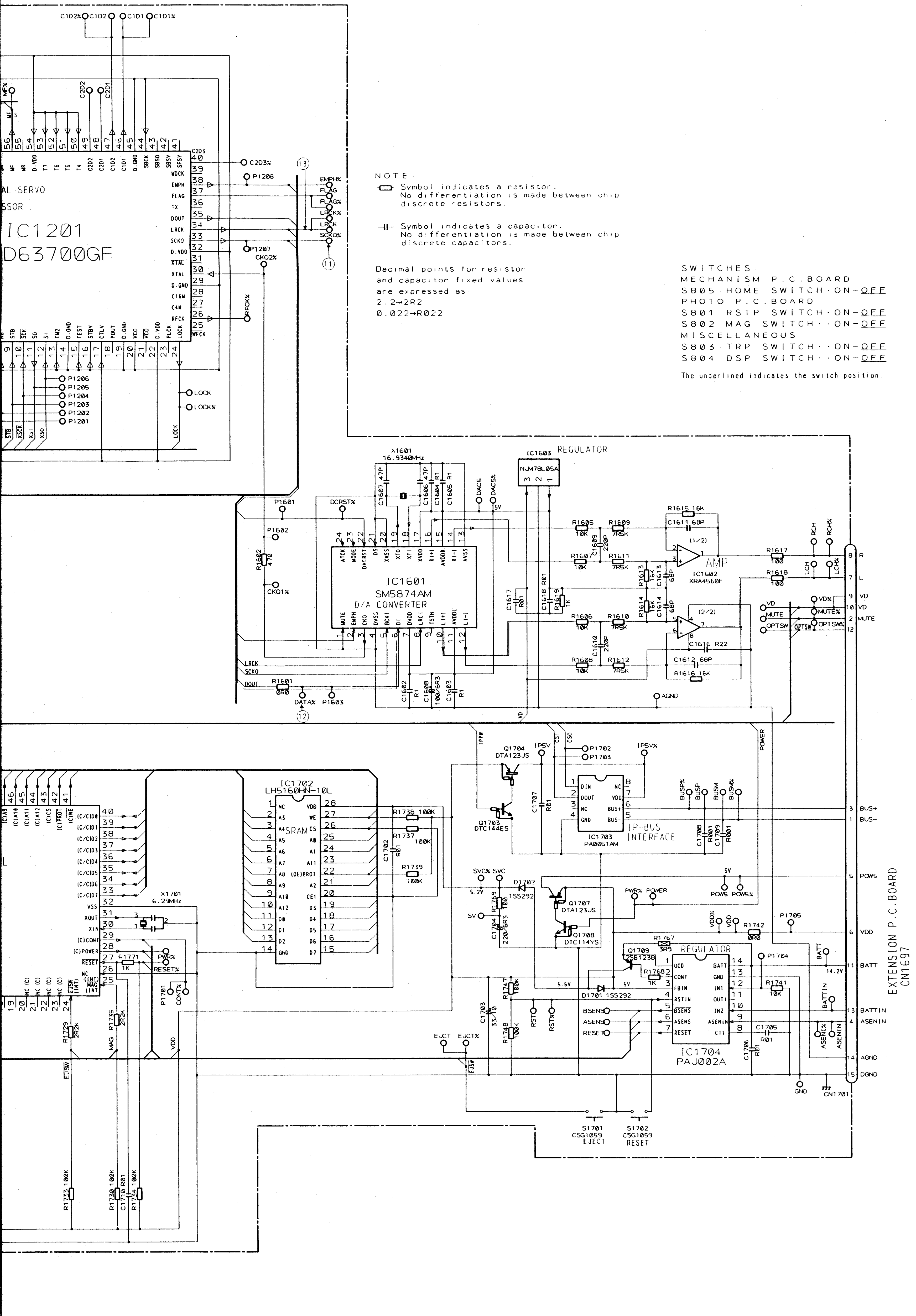
Symbol indicates a resistor.
No differentiation is made between chip
discrete resistors.

Symbol indicates a capacitor.
No differentiation is made between chip
discrete capacitors.

Decimal points for resistor
and capacitor fixed values
are expressed as
2.2→2R2
0.022→R022

SWITCHES
MECHANIS
S805 HOM
PHOTO P.
S801 RST
S802 MAG
MISCELLA
S803 TRP
S804 DSP

The underlined i


IC1201
D63700GF
AL SERVO
SSOR
IC1601
SM5874AM
D/A CONVERTER
X1601
16.9340MHz
IC1603 REGULATOR
NJM78L05A
IC1602
XRA4560F
AMP
(1/2)
(2/2)
IC1702
LH5160HN-10L
SRAM
X1701
6.29MHz
IC1703
PA0051AM
IP-BUS
INTERFACE
IC1704
PAJ002A
REGULATOR
Q1704
DTA123JS
Q1703
DTC144ES
Q1707
DTA123JS
Q1708
DTC114YS
Q1709
2SB1238
D1702
1SS292
D1701 1SS292
S1701
CSG1059
EJECT
S1702
CSG1059
RESET
EXTENSION P.C.BOARD
CN1697
CN1701
BUS+
BUS-
POWS
VDD
BATT
BATTIN
ASENIN
AGND
DGND
R
L
VD
MUTE
GND
14.2V
5V
5.2V
5.6V

NOTE:

▭ Symbol indicates a resistor.
No differentiation is made between chip discrete resistors.

—||— Symbol indicates a capacitor.
No differentiation is made between chip discrete capacitors.

Decimal points for resistor and capacitor fixed values are expressed as:
2.2→2R2
0.022→R022

SWITCHES:
MECHANISM P.C.BOARD
S805: HOME SWITCH: ON-OFF
PHOTO P.C.BOARD
S801: RSTP SWITCH: ON-OFF
S802: MAG SWITCH: ON-OFF
MISCELLANEOUS
S803: TRP SWITCH: ON-OFF
S804: DSP SWITCH: ON-OFF
The underlined indicates the switch position.

Fig.6

SAFETY INFORMATION

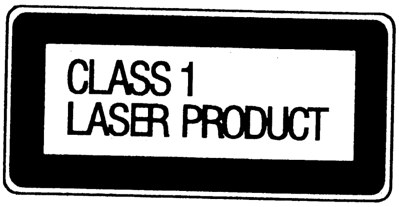
1. Safety Precautions for those who Service this Unit.

- **Follow the adjustment steps in the service manual when servicing this unit. When checking or adjusting the emitting power of the laser diode exercise caution in order to get safe, reliable results.**

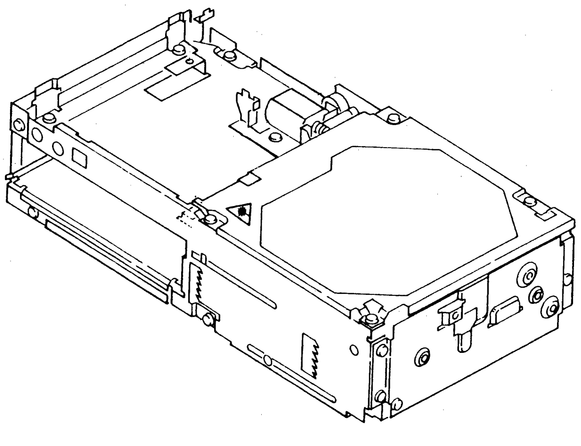
Caution:

1. **During repair or tests, minimum distance of 13cm from the focus lens must be kept.**
2. **During repair or tests, do not view laser beam for 10 seconds or longer.**

2. A "CLASS 1 LASER PRODUCT" label is affixed to the rear of the player.



3. The triangular label is attached to the mechanism unit frame.



4. Specifications of Laser Diode

Specifications of laser radiation fields to which human access is possible during service.

Wavelength = 785 nanometers

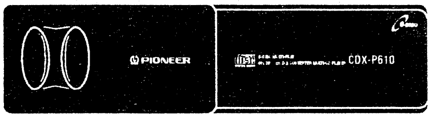
Radiant power = 69.7 microwatts(Through a circular aperture stop having a diameter of 80 millimeters)
0.55 microwatts(Through a circular aperture stop having a diameter of 7 millimeters)

4261

PIONEER
The Art of Entertainment

Service Manual

·CDX-P610



ORDER NO.
CRT1632

The chapter 1 of this Service Manual will not be reprinted. On your additional orders, we may supply only the chapter 2. For the chapter 1, please make copies and attach to the chapter 2 at your side if necessary.

MULTI-COMPACT DISC PLAYER

CDX-P616 UC
CDX-P610 UC,EW,ES
CDX-P610 X1B/EW

- **See the separate manual CX-624 (CRT1631) for the CD mechanism description and disassembly.**
- **The CD mechanism employed in this model is one of CX-624 series.**

SPECIFICATIONS

General

System	Compact disc audio system
Usable discs	Compact Disc
Signal format	Sampling frequency: 44.1 kHz Number of quantization bits: 16; linear
Power source	14.4 V DC (10.8 - 15.6 V allowable)
Max. current consumption	1.0 A
Weight	2.4 kg (5.3 lbs.)
Dimensions	275 (W) × 69 (H) × 155 (D) mm [10-7/8 (W) × 2-3/4 (H) × 6-1/8 (D) in.]

Audio

Frequency characteristics	5 - 20,000 Hz (1 dB)
Signal-to-noise ratio	92 dB (1 kHz) (IHF-A Network)
Distortion	0.006 %
Dynamic range	90 dB (1 kHz)
Output level	1,000 mV (1 kHz, 0 dB)
Number of channels	2 (stereo)

These specifications were determined and are presented in accordance with specification standards established by the Ad Hoc Committee of Car Stereo Manufacturers.
Note:
Specifications and design are subject to possible modification without prior notice due to improvements.

CONTENTS

CHAPTER 1

1. SAFETY INFOMATION..1-2
2. OPERATIONS AND CONNECTION 1-3
3. DISASSEMBLY..1-4
4. ADJUSTMENT 1-5
5. CIRCUIT DESCRIPTION 1-18
6. EXPLODED VIEW PARTS LIST 1-39
7. ELECTRICAL PARTS LIST 1-42

CHAPTER 2

1. EXPLODED VIEW 2-3
2. PACKING METHOD..2-8
3. CONNECTION DIAGRAM(1)...............................2-13
4. SCHEMATIC CIRCUIT DIAGRAM(1)....................2-17
5. SCHEMATIC CIRCUIT DIAGRAM(2)....................2-20
6. CONNECTION DIAGRAM(2)...............................2-23
7. BLOCK DIAGRAM 2-25

PIONEER ELECTRONIC CORPORATION 4-1,Meguro 1-Chome,Meguro-ku, Tokyo 153,Japan
PIONEER ELECTRONICS SERVICE INC. P.O.Box 1760,Long Beach,California 90801 U.S.A.
PIONEER ELECTRONICS OF CANADA, INC. 300 Allstate Parkway Markham,Ontario L3R OP2 Canada
PIONEER ELECTRONIC [EUROPE] N.V. Haven 1087 Keetberglaan 1,9120 Melsele,Belgium
PIONEER ELECTRONICS AUSTRALIA PTY.LTD. 178-184 Boundary Road,Braeside,Victoria 3195,Australia TEL:[03]580-9911

42 61

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K-FFS.OCT. 1994 Printed in Japan

CHAPTER 1

1. SAFETY INFORMATION

1.1 CDX-P616/UC,P610/UC

CAUTION

This service manual is intended for qualified service technicians; it is not meant for the casual do-it-yourselfer. Qualified technicians have the necessary test equipment and tools, and have been trained to properly and safely repair complex products such as those covered by this manual.
Improperly performed repairs can adversely affect the safety and reliability of the product and may void the warranty. If you are not qualified to perform the repair of this product properly and safely; you should not risk trying to do so and refer the repair to a qualified service technician.

WARNING

Lead in solder used in this product is listed by the California Health and Welfare agency as a known reproductive toxicant which may cause birth defects or other reproductive harm (California Health & Safety Code, Section 25249.5). When servicing or handling circuit boards and other components which contain lead in solder, avoid unprotected skin contact with the solder. Also, when soldering do not inhale any smoke or fumes produced.

1.2 CDX-P610/EW,X1B/EW

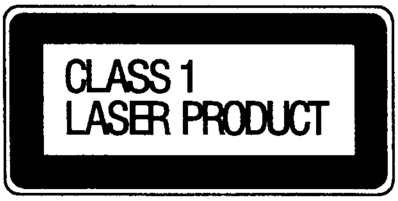
1. **Safety Precautions for those who Service this Unit.**

- **Follow the adjustment steps (see pages 1-5 through 1-14)in the service manual when servicing this unit. When checking or adjusting the emitting power of the laser diode exercise caution in order to get safe, reliable results.**

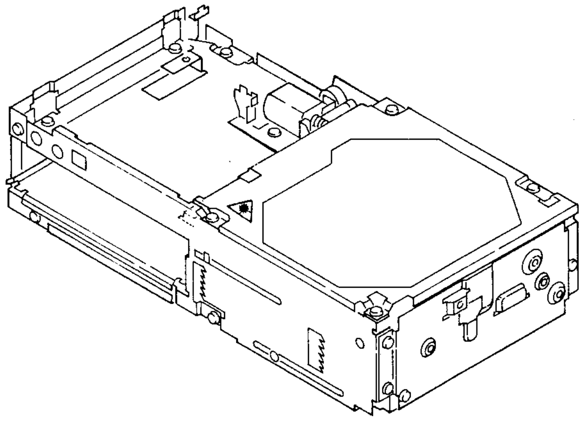
Caution:

1. **During repair or tests, minimum distance of 13cm from the focus lens must be kept.**
2. **During repair or tests, do not view laser beam for 10 seconds or longer.**

2. **A "CLASS 1 LASER PRODUCT" label is affixed to the rear of the player.**



3. **The triangular label is attached to the mechanism unit frame.**



4. **Specifications of Laser Diode**

Specifications of laser radiation fields to which human access is possible during service.
Wavelength = 785 nanometers
Radiant power = 69.7 microwatts(Through a circular aperture stop having a diameter of 80 millimeters)
0.55 microwatts(Through a circular aperture stop having a diameter of 7 millimeters)

2. OPERATIONS AND CONNECTION

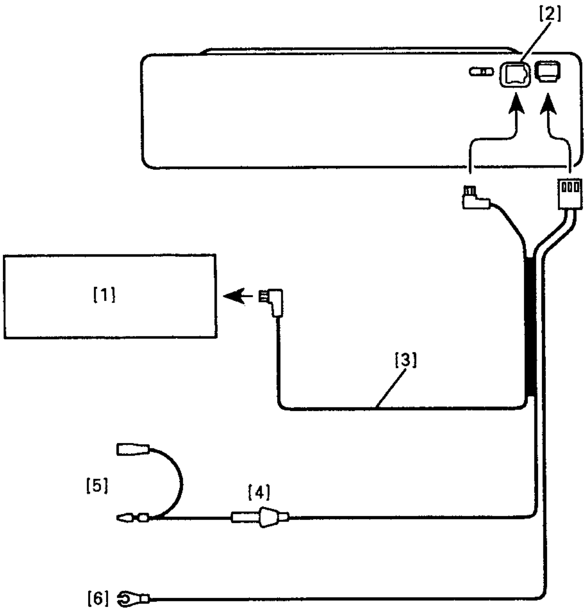


Fig.1

(Fig. 1)

[1] Multi CD controller or Multiple installation adapter (such as CD-P44)

[2] IP-BUS output (black)
Connect the black connector of the cable to this connector.

[3] IP-BUS cable
To prevent incorrect connection, the input side of the IP-BUS connector is colored in blue, and the output side in black. Connect the connectors of the same colors correctly.

[4] Fuse holder

[5] Orange
To the terminal always supplied with power regardless of ignition switch position.

[6] Black (ground)
To the vehicle (metal) body.

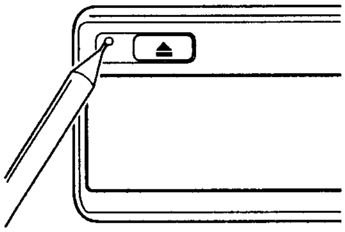


Fig.2

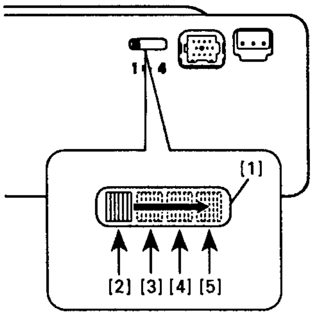


Fig.3

Pressing the clear button

If the power does not switch on or if the compact disc player does not operate when the button on the multi-CD controller is pressed, or if the multi-CD controller display is incorrect, press this button on the player with the tip of a pencil to restore normal operation. (This button is located inside the door.)Always press the clear button on the multi-CD contoller, too, after pressing this button (Fig. 2).

- If the clear button is pressed when the player contains a magazine or the ignition switch is set to the ON or ACC position, the CD title display and ITS memory are cleared.

Changing the Address Switch

- This unit can be connected from the second to fourth multi-CD players by using the separately sold multiple installation adapter (CD-P44). Each multi-CD player has an address switch so that the multiple installation adapter can identify which player is which. Set the address switch for each player as shown in Fig. 3.
- See the instruction manual for the multiple installation adapter (CD-P44) when you connect multi-CD players using the adapter.

(Fig. 3)

[1] Address switch
This switch can be set to address 1, 2, 3, or 4, starting from the left.

[2] Address 1

[3] Address 2

[4] Address 3

[5] Address 4

3. DISASSEMBLY

● Removing the Case

1. Remove the five screws.
2. Remove the upper case and lower case.

● Removing the Grille Assy

1. Press the four tabs indicated by arrows and then pull out the grille assy.

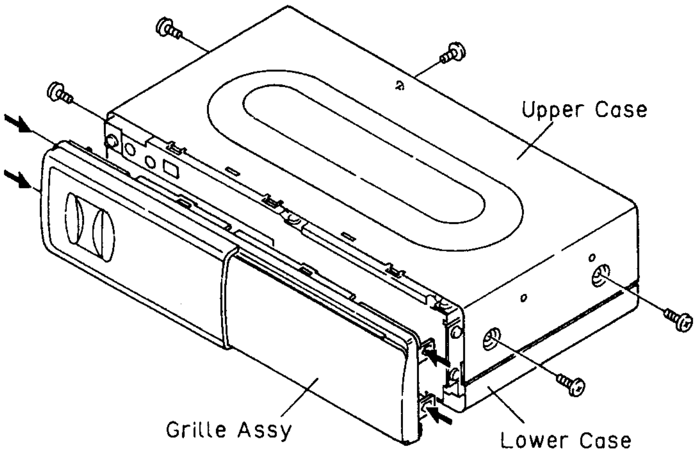

Upper Case
Grille Assy
Lower Case

Fig.4

● Removing the Extension P.C.Board

1. Remove the one screw.
2. Unbend the tab A until straight.
3. Remove the extension p.c.board.

● Removing the Main Unit

1. Remove the one screw.
2. Unbend the tab B until straight.
3. Remove the main unit.

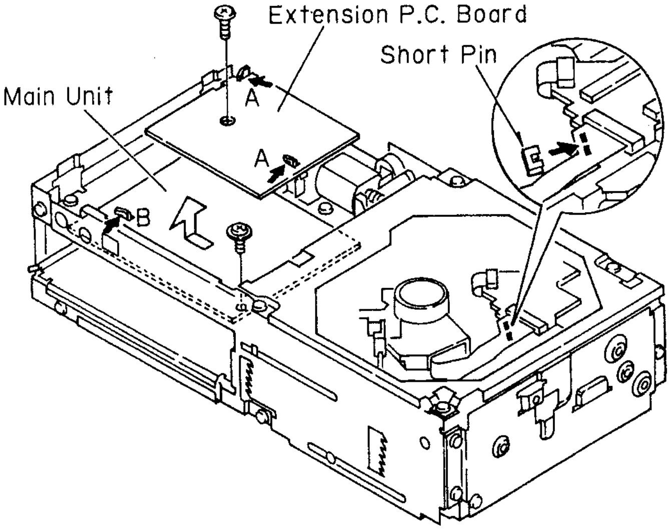

Extension P.C. Board
Short Pin
Main Unit
A
A
B

Fig.5

Before disconnecting the connector(PU unit connector), attach a short pin as illustrated.

4. ADJUSTMENT

4.1 CD ADJUSTMENT

1)Precautions

- This unit uses a single power supply (+5V) for the regulator. The signal reference potential, therefore, is connected to REFO(approx. 2.5V) instead of GND.
  If REFO and GND are connected to each other by mistake during adjustments,not only will it be impossible to measure the potential correctly,but the servo will malfunction and a severe shock will be applied to the pick-up. To avoid this,take special note of the following.
  Do not connect the negative probe of the measuring equipment to REFO and GND together. It is especially important not to connect the channel 1 negative probe of the oscilloscope to REFO with the channel 2 negative probe connected to GND.
  Since the frame of the measuring instrument is usually at the same potential as the negative probe,change the frame of the measuring instrument to floating status.
  If by accident REFO comes in contact with GND,immediately switch the regulator or power OFF.

- Always make sure the regulator is OFF when connecting and disconnecting the various filters and wiring required for measurements.

- Before proceeding to further adjustments and measurements after switching regulator ON,let the player run for about one minute to allow the circuits to stabilize.

- Since the protective systems in the unit's software are rendered inoperative in test mode,be very careful to avoid mechanical and /or electrical shocks to the system when making adjustment.

- This unit is adjusted in a combination with the CD control unit (KEH-P7000, etc.). Each regulator key should be operated at the unit.
  With the KEH-P7000 taken up for reference, a description will be given below concerning how to enter into the test mode, including key operations. The key in the adjustment text is also one of the KEH-P7000 keys.

- How to enter into the test mode
  Switch ACC,back-up ON while pressing the 4 and 6 keys together.

- Resetting the test mode
  Switch ACC,back-up Off.

- Disc detection during loading and eject operations is performed by means of a photo transistor in this unit.Consequently,if the inside of the unit is exposed to a strong light source when the outer casing is removed for repairs or adjustment,the following malfunctions may occur.
  *During PLAY, even if the eject button is pressed,the disc will not be ejected and the unit will remain in the PLAY mode.
  *The unit will not load a disc.
  When the unit malfunctions this way,either re-position the light source,move the unit or cover the photo transistor.

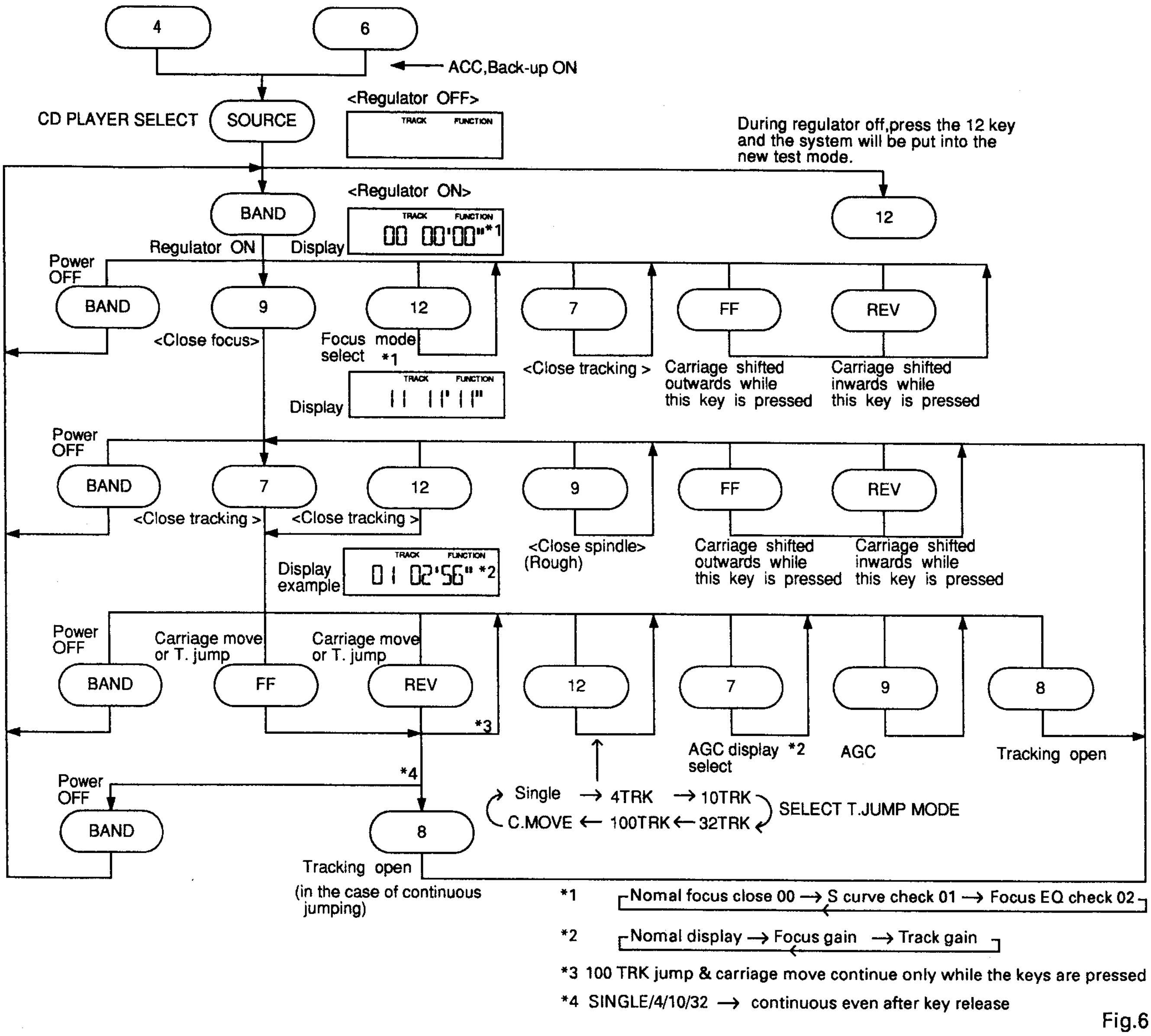
- When loading and unloading discs during adjustment procedures,always wait for the disc to be properly clamped or ejected before pressing another key. Otherwise, there is a risk of the actuator being destroyed.

- Turn power off when pressing the button **FF** or the button **REV** key for focus search in the test mode. (Or else lens may stick and the actuator may be damaged.)

- SINGLE/4TRK/10TRK/32TRK will continue to operate even after the key is released.Tracking is closed the moment C-MOVE is released.

- JUMP MODE resets to SINGLE as soon as power is switched off.

Flow Chart


4
6
ACC,Back-up ON
CD PLAYER SELECT
SOURCE
<Regulator OFF>
TRACK FUNCTION
During regulator off,press the 12 key and the system will be put into the new test mode.
<Regulator ON>
BAND
TRACK FUNCTION
00 00'00"*1
12
Regulator ON
Display
Power OFF
BAND
9
12
7
FF
REV
<Close focus>
Focus mode select *1
Display
TRACK FUNCTION
11 11'11"
<Close tracking >
Carriage shifted outwards while this key is pressed
Carriage shifted inwards while this key is pressed
Power OFF
BAND
7
12
9
FF
REV
<Close tracking >
<Close tracking >
Display example
TRACK FUNCTION
01 02'56" *2
<Close spindle> (Rough)
Carriage shifted outwards while this key is pressed
Carriage shifted inwards while this key is pressed
Power OFF
Carriage move or T. jump
Carriage move or T. jump
BAND
FF
REV
12
7
9
8
*3
AGC display *2 select
AGC
Tracking open
*4
Power OFF
BAND
8
Single → 4TRK → 10TRK
C.MOVE ← 100TRK ← 32TRK
SELECT T.JUMP MODE
Tracking open
(in the case of continuous jumping)

*1 Nomal focus close 00 → S curve check 01 → Focus EQ check 02

*2 Nomal display → Focus gain → Track gain

*3 100 TRK jump & carriage move continue only while the keys are pressed

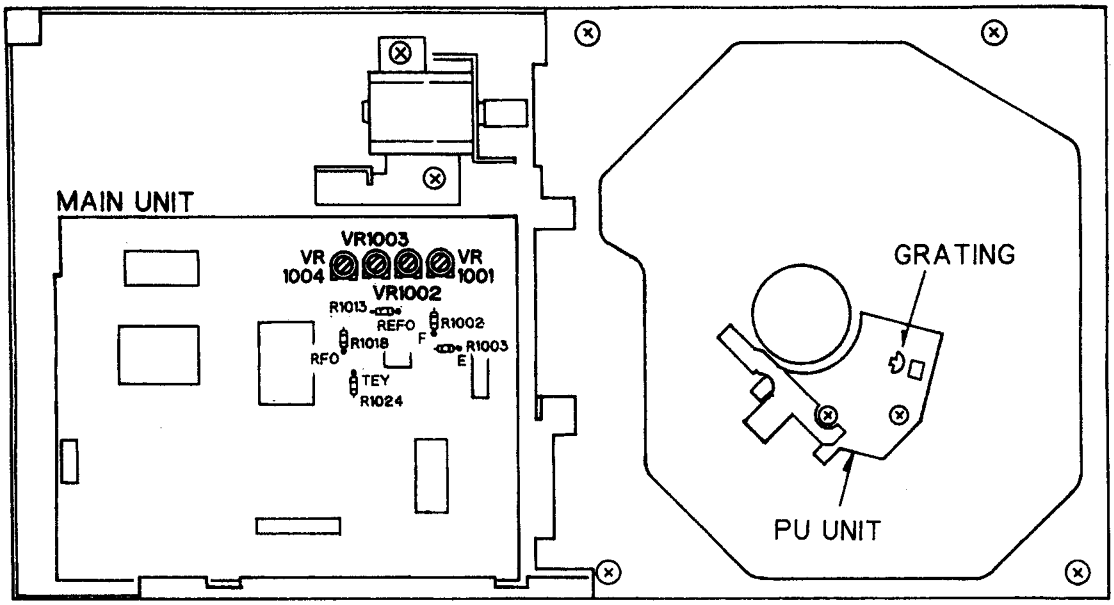
*4 SINGLE/4/10/32 → continuous even after key release

Fig.6

Measuring Equipment and Jigs

Adjustment	Measuring equipment & jigs
1 Tracking Error Offset Adjustment 1	DC V Meter
2 Grating Check / Adjustment 1	Oscilloscope, ABEX TCD-784 (or SONY TYPE 4), Two L.P.F., Clock Driver
3 Grating Adjustment 2	Oscilloscope, Grating Adjustment Filter (B.P.F.),mV Meter, ABEX TCD-784 (or SONY TYPE 4), Two L.P.F., Clock Driver
4 Tracking Balance Adjustment 1	Oscilloscope, Low-pass Filter, ABEX TCD-784 (or SONY TYPE 4)
5 Focus Bias Adjustment	Oscilloscope, ABEX TCD-784 (or SONY TYPE 4)
6 RFO Offset Adjustment	Oscilloscope, ABEX TCD-784 (or SONY TYPE 4)
7 Tracking Error Offset Adjustment 2	DC V Meter
8 Tracking Balance Adjustment 2	Oscilloscope, Low-pass Filter, ABEX TCD-784 (or SONY TYPE 4)

● Adjustment Point and Test Point


MAIN UNIT
VR1003
VR 1004
VR 1001
VR1002
R1013
REFO
R1002
F
R1018
RFO
R1003
E
TEY
R1024
GRATING
PU UNIT

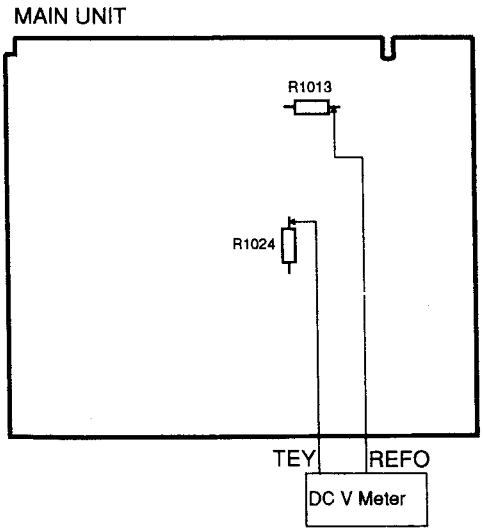
VR1001	TRACKING ERROR OFFSET
VR1002	TRACKING BALANCE
VR1003	FOCUS ERROR BIAS
VR1004	RFO OFFSET

Fig.7

1 Tracking Error Offset Adjustment 1

- **Purpose :**
  To adjust the offset of the tracking pre-amp to zero.
- **Symptoms of Mal-adjustment :**
  Track search NG, Carriage runaway, Poor playability.

·Measuring Equipment / Jig	·DC V Meter
·Measuring Point	·TEY
·Test Disc , Mode	·No disc, TEST MODE
·Adjustment Point	·VR1001(TE OFFSET VR)



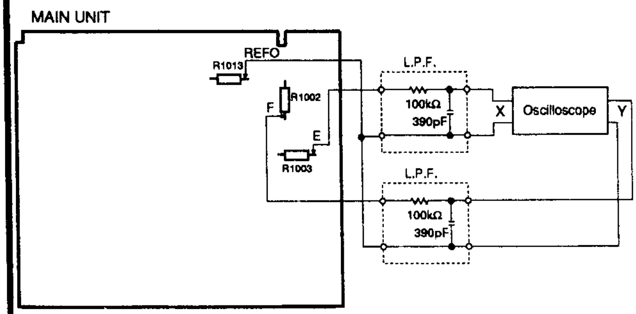
Adjustment Procedure

1.Switch the regulator on.
2.Using VR1001, adjust TEY to 0 ± 25mV w.r.t. REFO.

2 Grating Check / Adjustment 1

- **Purpose :**
  To check that the PU grating is correctly aligned after the PU unit has been replaced.
- **Symptoms of Mal-adjustment :**
  Unable to play disc, track skip during search, search NG.

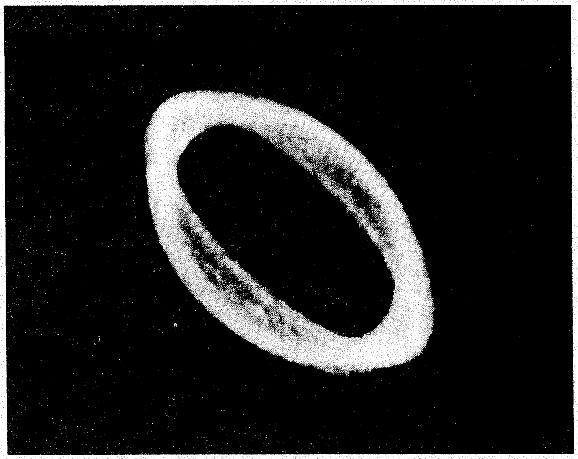
·Measuring Equipment / Jig	·Oscilloscope, Two L.P.F., Clock Driver
·Measuring Point	·E, F
·Test Disc , Mode	·ABEX TCD-784 (or SONY TYPE 4), TEST MODE
·Adjustment Point	·Grating hole



Adjustment Procedure

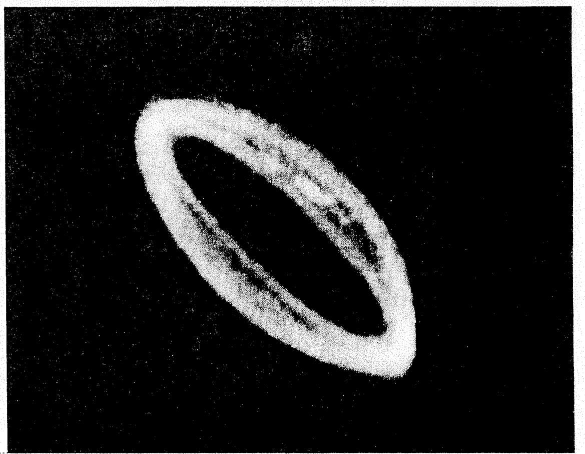
1.Load disc and switch regulator on.
2.Position the PU in the center of the disc using the **FF & REV** keys.
3.Press key **9** to close focus and once more to close spindle.
4.Refering to the photographs given check that the grating is within ±45°. If not, it should be possible to make a fine adjustment to the grating by slowly tuning the grating screw. If, however during the adjustment the lissajous figure is seen to "FLIP" then the null point must be found and the adjustment made from there(see next section).

Lissajous figure (AC input)
Horizontal axis E 10mV/div.
Vertical axis F 10mV/div.



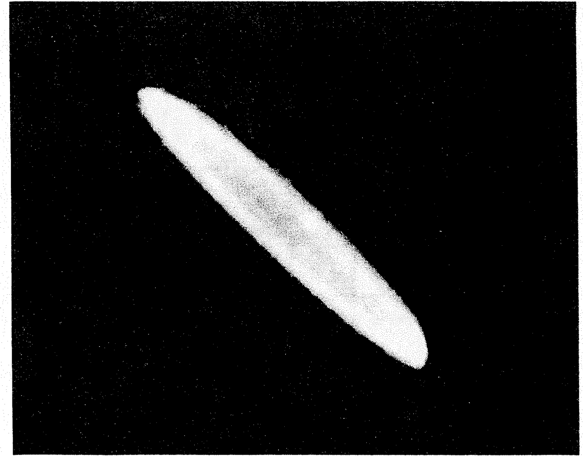
60°=NG

Waveform 1



45°=OK
(Limit)

Waveform 2



0°=BEST
(Doesn't become
a single line due
to eccentricity)

Waveform 3

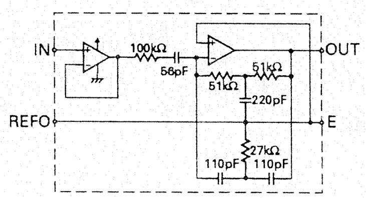
3 Grating Adjustment 2

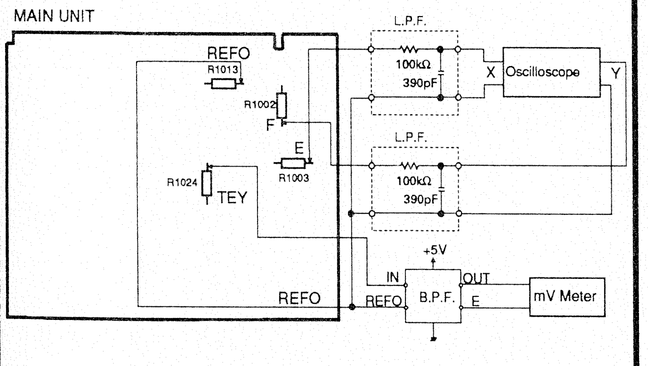
·**Purpose :**
This needs to be done if the previous adjustment was unsuccessful.

·**Symptoms of Mal-adjustment :**
Unable to play disc, track skipping, track search NG.

·**Measuring Equipment / Jig**	·Oscilloscope, Grating Adjustment filter (B.P.F.), mV Meter, Two L.P.F., Clock Driver
·**Measuring Point**	·TEY, E, F
·**Test Disc , Mode**	·ABEX TCD-784 (or SONY TYPE 4), TEST MODE
·**Adjustment Point**	·Grating hole

B.P.F.


IN
100kΩ
56pF
51kΩ
51kΩ
220pF
OUT
REFO
E
27kΩ
110pF
110pF

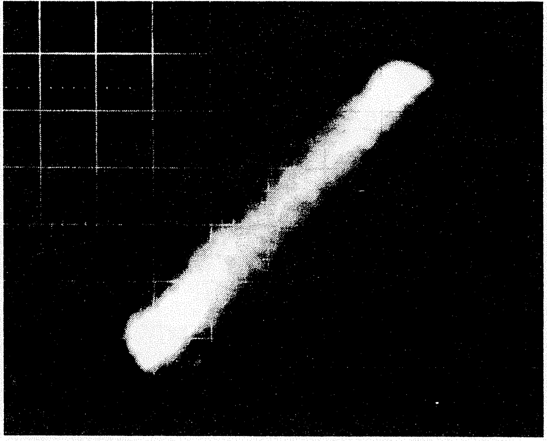

MAIN UNIT
REFO
R1013
R1002
F
E
R1003
R1024
TEY
REFO
L.P.F.
100kΩ
390pF
X
Oscilloscope
Y
L.P.F.
100kΩ
390pF
+5V
IN
OUT
REFO
B.P.F.
E
mV Meter

Adjustment Procedure

1. Load disc and switch regulator on.
2. Position the PU unit in the center of the disc using the **FF & REV** keys.
3. Press key **9** to close focus and press once more to close spindle.
4. While monitoring the output of the B.P.F. connected to TEY, slowly turn the grating screw. The output voltage should pass through many minimums; search for the minimum which is clearly smaller than the rest - this is the "null point", where the E & F sub-beams are lined up with the tracks on the disc.
5. From this null point, turn the grating screw clockwise (as seen from the underside of the PU unit) until the lissajous waveform is a single line (or close as possible) as shown in the photograph.

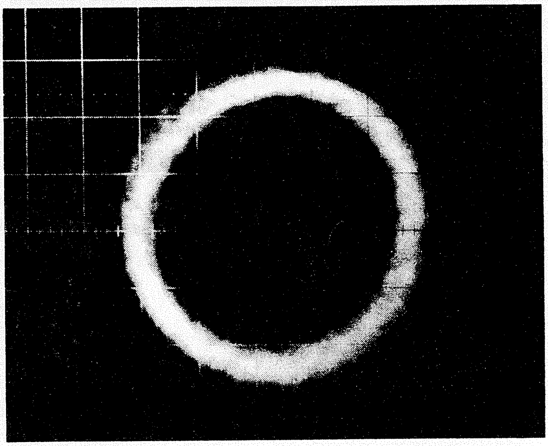
Lissajous figure (AC input)
Horizontal axis E 10mV/div.
Vertical axis F 10mV/div.

Null Point=180°



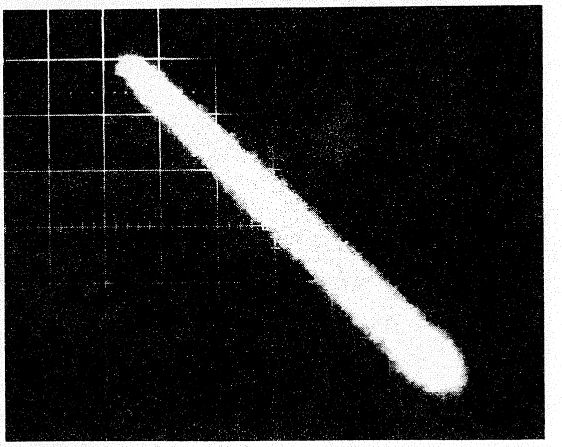
Waveform 4

"Rough" adjustment=90°



Waveform 5

Final adjustment=0°

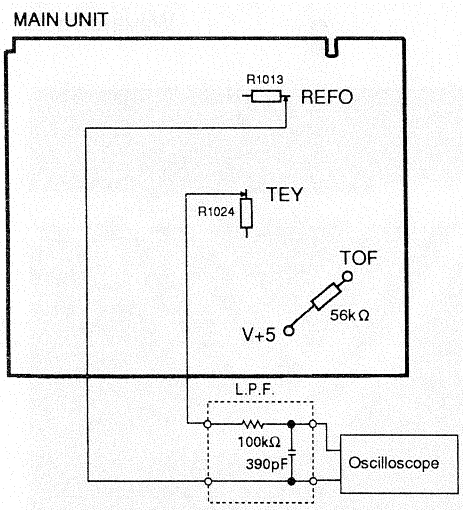


Waveform 6

4 Tracking Balance Adjustment 1

- **Purpose :**
  To equate the sensitivity of the F channel to that of the E channel.
- **Symptoms of Mal-adjustment :**
  Track search NG, Poor playability carriage runaway.

·**Measuring Equipment / Jig**	·Oscilloscope, L.P.F.
·**Measuring Point**	·TEY
·**Test Disc , Mode**	·ABEX TCD-784 (or SONY TYPE 4), TEST MODE
·**Adjustment Point**	·VR1002 (T.BAL VR)



Pull up the TOF terminal to the V+5 terminal with a 56kΩ resistor.
(This is in order to cancel lens offset in the tracking direction.)
(Sub-number of the main unit's p.c.board is -C and after.)
NOTE: If the sub-number of the main unit's p.c.board is -B, it means there is no TOF terminal, so instead of attaching a pull-up resistor, adjust the item by tilting 45° in the direction where the grille is lifted.

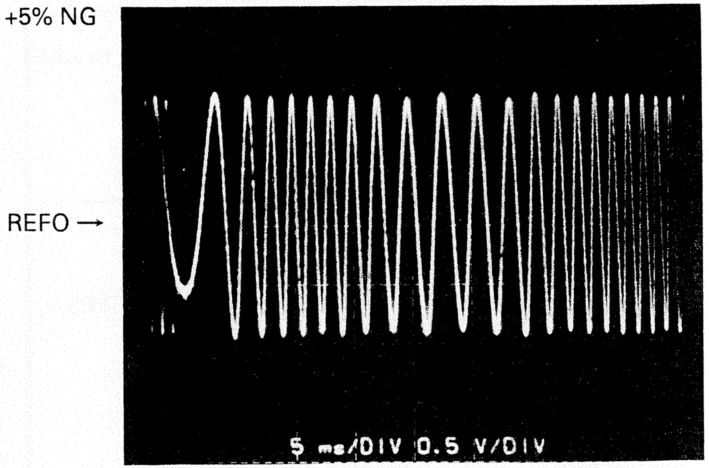
Adjustment Procedure

1. Load disc and switch the regulator on.
2. Position the PU unit in the center of the disc using the **FF & REV** keys.
3. Close focus by pressing key **9**.
4. Observing the TEY waveform on the oscilloscope, adjust VR1002 until the positive and negative halves have the same amplitude (see waveform 7–9).

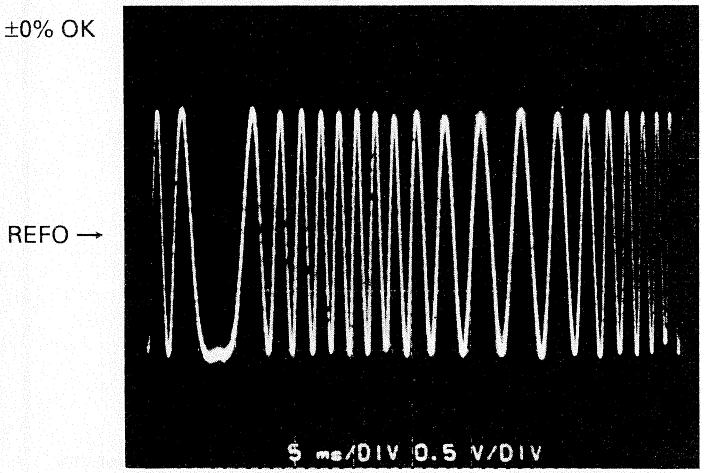
Check

After adjustment the TEY waveform should have an amplitude of 1.5±0.65 Vpp (ABEX TCD-784 or SONY TYPE 4)
(Providing focus bias is OK)

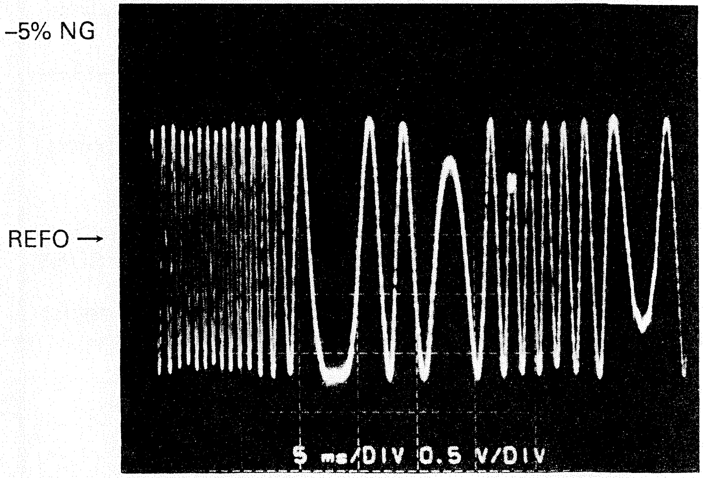
DC Mode
0.5V/div.
5ms/div.



Waveform 7



Waveform 8

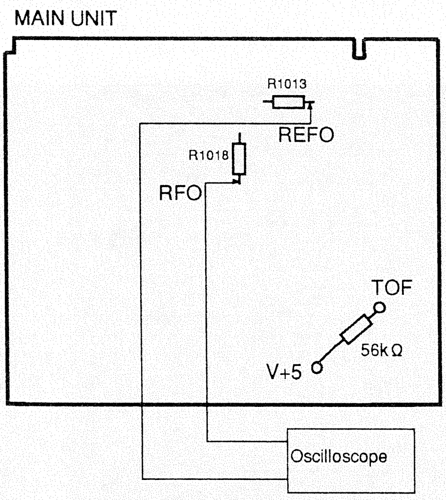


Waveform 9

5 Focus Bias Adjustment

- **Purpose :**
  To adjust the focus servo reference so that the RF waveform is an optimum.
- **Symptoms of Mal-adjustment :**
  Difficulty in closing focus, poor playability.

Measuring Equipment / Jig	·Oscilloscope
Measuring Point	·RFO
Test Disc , Mode	·ABEX TCD-784 (or SONY TYPE 4), NORMAL MODE
Adjustment Point	·VR1003 (FE BIAS VR)



Pull up the TOF terminal to the V+5 terminal with a 56kΩ resistor.
(This is in order to cancel lens offset in the tracking direction.)
(Sub-number of the main unit's p.c.board is -C and after.)
NOTE: If the sub-number of the main unit's p.c.board is -B, it means there is no TOF terminal, so instead of attaching a pull-up resistor, adjust the item by tilting 45° in the direction where the grille is lifted.

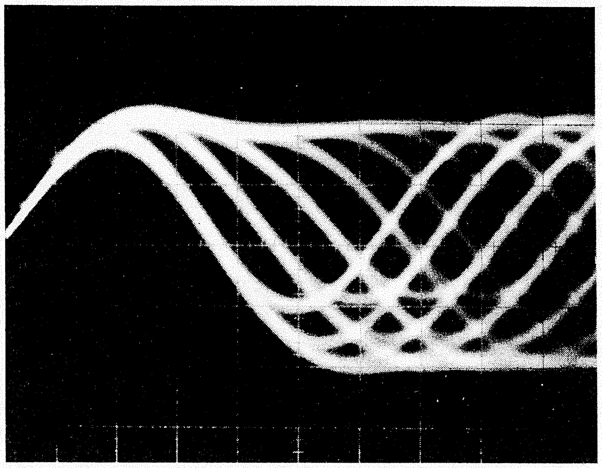
Adjustment Procedure

1. Play track number 18.
2. Adjust VR1003 so that the RFO waveform amplitude is a maximum and eye pattern is optimum.

Check

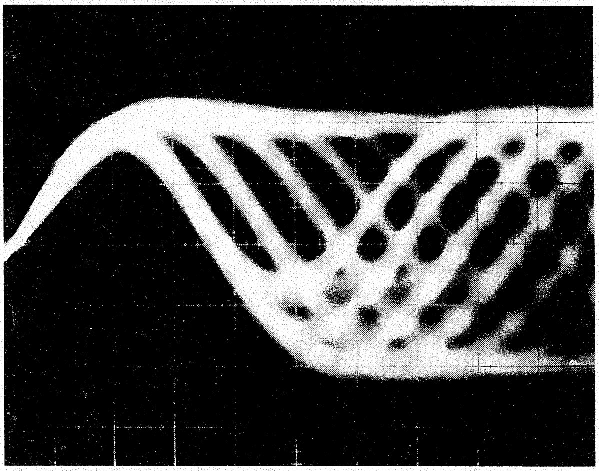
After adjustment the RFO waveform should have an amplitude of 1.7±0.65 Vpp (ABEX TCD-784 or SONY TYPE 4)

3. Remove the pull-up resistor after completing adjustment.



OK

Waveform 10



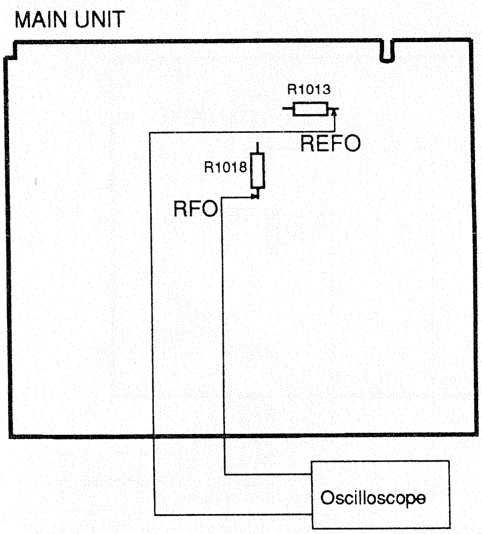
NG

AC Mode Before adjustment Waveform 11

6 RFO Offset Adjustment

·Purpose
To adjust the RFO waveform offset to an optimum.
·Symptoms of Mal-adjustment
Difficulty in closing focus, poor playability.

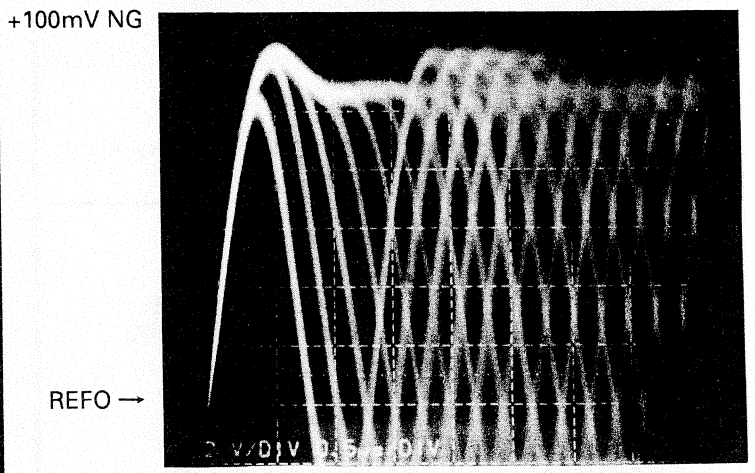
·Measuring Equipment / Jig	·Oscilloscope
·Measuring Point	·RFO
·Test Disc , Mode	·ABEX TCD-784 (or SONY TYPE 4), NORMAL MODE
·Adjustment Point	·VR1004 (RFO OFFSET VR)



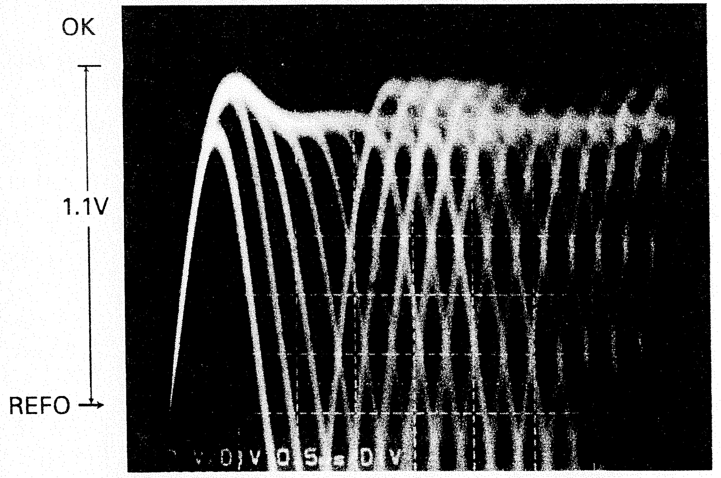
Adjustment Procedure

1. Make sure the TOF terminal's pull-up resistor has been disconnected.
2. Play track number 18.
3. Adjust VR1004 so that the peak value of the upper envelope of the RFO waveform is at +1.1VDC w.r.t. REFO(See waveform 12–14).

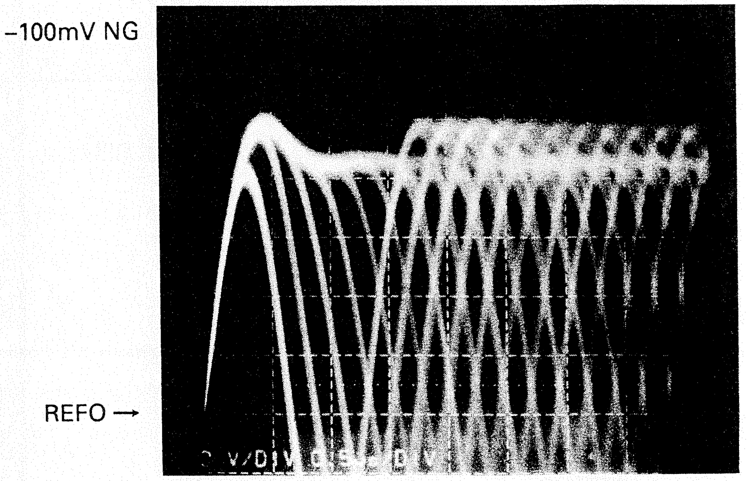
DC Mode
0.2V/div.
0.5µs/div.



Waveform 12



Waveform 13

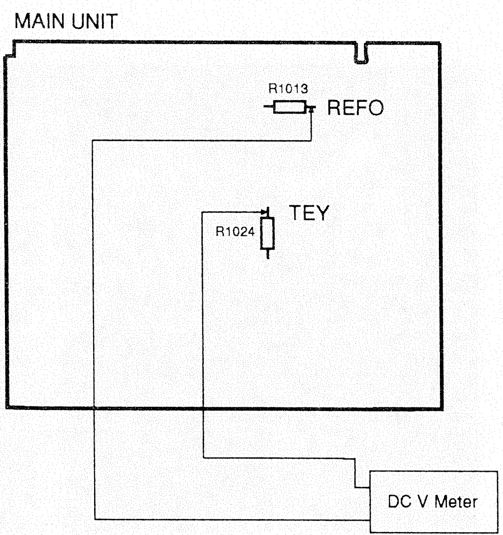


Waveform 14

7 Tracking Error Offset Adjustment 2

- **Purpose :**
  To check the offset of the tracking pre-amp is zero and adjust if necessary.
- **Symptoms of Mal-adjustment :**
  Track search NG, Carriage runaway, Poor playability.

· **Measuring Equipment / Jig**	· DC V Meter
· **Measuring Point**	· TEY
· **Test Disc , Mode**	· No disc, TEST MODE
· **Adjustment Point**	· VR1001(TE OFFSET VR)



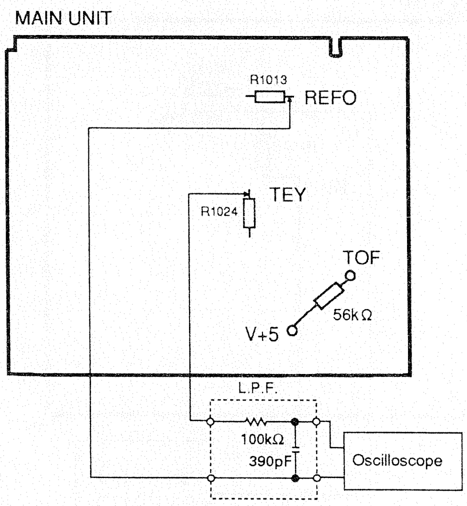
Adjustment Procedure

1. Switch the regulator on.
2. Using VR1001, adjust TEY to 0 ± 25mV w.r.t. REFO.

8 Tracking Balance Adjustment 2

- **Purpose :**
  To equate the sensitivity of the F channel to that of the E channel. This needs only be done if the TE OFFSET volume was re-adjusted in the previous step.
- **Symptoms of Mal-adjustment:**
  Track search NG, Poor playability, carriage runaway.

· **Measuring Equipment / Jig**	· Oscilloscope, L.P.F.
· **Measuring Point**	· TEY
· **Test Disc , Mode**	· ABEX TCD-784 (or SONY TYPE 4), TEST MODE
· **Adjustment Point**	· VR1002 (T.BAL VR)



Pull up the TOF terminal to the V+5 terminal with a 56kΩ resistor. (This is in order to cancel lens offset in the tracking direction.) (Sub-number of the main unit's p.c.board is -C and after.)

NOTE: If the sub-number of the main unit's p.c.board is -B, it means there is no TOF terminal, so instead of attaching a pull-up resistor, adjust the item by tilting 45° in the direction where the grille is lifted.

Adjustment Procedure

1. Load disc and switch the regulator on.
2. Position the PU unit in the center of the disc using the **FF & REV** keys.
3. Close focus by pressing key **9**.
4. Observing the TEY waveform on the oscilloscope, adjust VR1002 until the positive and negative halves have the same amplitude (See waveform 7–9).

Check

After adjustment the TEY waveform should have an amplitude of 1.5±0.65 Vpp (ABEX TCD-784 or SONY TYPE 4)

5. Remove the pull-up resistor after completing adjustment.

4.2 NEW TEST MODE

● New Test Mode(aging operation and setup analysis)

The single CD player plays in normal mode. After being set up, it will display FOK (focus), LOCK (spindle), subcode, sound skip, protection against a mechanical error or the like, occurrence of an error, cause and time of an expiry, if any, (and disc number)

During the setup, the CD software operation status (internal RAM and C-point)is displayed.

(1) How to enter NEW TEST Mode

See the test mode flow chart Page 1-6.

(2) Relations of keys between TEST and NEW TEST Modes

Keys	Test Mode		New Test Mode	
	Regulator OFF	Regulator ON	PLAY in progress	Error Occurred, Protection Activated
BAND	Regulator ON	Regulator OFF	—	Time of occurrence/ cause of error select
FF	—	FWD-Kick	FF/TR+	—
REV	—	REV-Kick	REV/TR-	—
7	—	Tracking close	SCAN	—
8	—	Tracking open	MODE	—
9	—	Focus close	—	—
12	To New Test Mode	Jump Mode Select	AUTO/MANU	TRACK No./ time of occurrence select

Operations,such as EJECT, CD ON/OFF, etc. are performed normally

(3) Error Cause (Error Number) Code

Error Code	Classification	Mode	Description	Cause/Detail	
40	ELECTRIC	PLAY	FOK=L 100ms	Put out of focus	Scratch, Stain, Vibration, Servo defect, etc...
41	ELECTRIC	PLAY	LOCK=L 100ms	Spindle unlock	
42	ELECTRIC	PLAY	Subcode unacceptable 500ms	Failed to read subcode	
43	ELECTRIC	PLAY	Sound skipped	Last address memory operated	

(4) Indicating an Operation Status During Setup

Status No.	Description	Protection operation
01	Carriage home mode started	None
02	Carriage moving inwards	10-second time out, Home switch failed
03	Carriage moving outwards	10-second time out, Home switch failed
05	Carriage moving outwards	None
11	Setup started	None
12	Spindle turn/Focus search started	None
13	Waiting for focus closure (XSI=L)	Failure to close focus
10,14	Waiting for focus closure (FOK=H)	Failure to close focus
15, 16, 17	Focus closed, Tracking open	Focus disrupted
18	During focus AGC	Focus disrupted
19	During tracking AGC	Disrupted focus
20	Waiting for MIRR, LOCK or subcode read Carriage closed, SPINDLE=ADAPTIVE	Focus disrupted, MIRR NG, Failure to lock, failed to read subcode

(5) Example of Display.

- SET UP in progress

8 digits

TNo.	Min	Sec
11	11	11

4 digits(Auto)

TNo.
11

4 digits(Manual)

Min	Sec
11	11

- Operation (PLAY, SEARCH, etc.) in progress perfectly identical with that in the normal mode.

- Protection/Error upon occurrence(4 digits display)

(a) Error number indicated

E–xx

Select the display with the BAND key.

(b) Track number indicated

TNo.
10

(c) Absolute time indicated

Select the display with the 12 key.

Min	Sec
40	05

- Protection/Error upon occurrence(8 digits display)

(a) Error number indicated

ERROR–xx

Select the display with the BAND key.

(b) Track number and
absolute time indicated

TNo.	Min	Sec
10	40	05

● Error Number Indication

If the CD should fail to operate or if an error has taken place during operation the player will enter into the error mode, and the cause of the error will be numerically indicated.
This is aimed at assisting in analysis or repair.

(1) Basic Means of Display

·Examples of Display E-XX

(2) Error Codes

Error Code	Classification	Description	Cause/Detail
10	ELECTRIC	Carriage home failure	Carriage doesn't move to or from the innermost position →Home switch failed and/or carriage immobile
11	ELECTRIC	Focus failure	Focus failed →Defects, disc upside-down, severe vibration
12	ELECTRIC	SETUP failure Subcode failure	Spindle failed to lock or subcode unreadable →Spindle defective, defect, severe vibration
14	ELECTRIC	Mirror failure	Unrecorded CD-R The disc is upside-down, defects, vibration
17	ELECTRIC	Set up failure	AGC protect failed →Defects, disc upside-down, severe vibration
30	ELECTRIC	Search time out	Failed to reach target address →Carriage/tracking defective and/or defects
A0	SYSTEM	Power failure	Power overvoltage or short circuit detected →Switching transistor defective and/or power abnormal
50	MECHANISM	An error upon ejection	MAG switch release time has time out Elevation time out when eject
60	MECHANISM	An error while putting in and out the tray	Tray in / out time has time out Tray is caught when put in
70	MECHANISM	An error upon elevation	Elevation time has time out
80	MECHANISM	An error with an empty magazine inserted	No disc is available

5. CIRCUIT DESCRIPTION

5.1 PRE-AMPLIFIER STAGE (UPC2571GS)

The optical signals are converted to voltage signals using an i/v amplifier inside the PU unit.

These voltage signals (A - F) are further processed by this pre-amp stage.

The pre-amplifier performs the following tasks

- Automatic power control of the PU unit's laser diode.
- Generation of an equalized RF signal from the photo-detector outputs (A - D).
- Generation of a focus error signal from the photo-detector outputs (A - D).
- Generation of a tracking error signal from the photo-detector outputs (E & F).
- Generation of a tracking zero crossing signal from the photo-detector outputs (E & F).

This IC runs from a single voltage supply (+5V). The reference voltage for this IC, the PU unit, and all the servo circuitry is REFO. This is obtained from pin 19 of the pre-amp ; which in turn is derived from the output REFOUT of the servo LSI, IC1201, UPD63700GF. The voltages REFOUT and REFO should be at +2.5V DC with respect to GND. All measurements and observations should be made using REFO as the reference as this is a buffered output. Care should be taken not to inadvertently short REFO to GND.

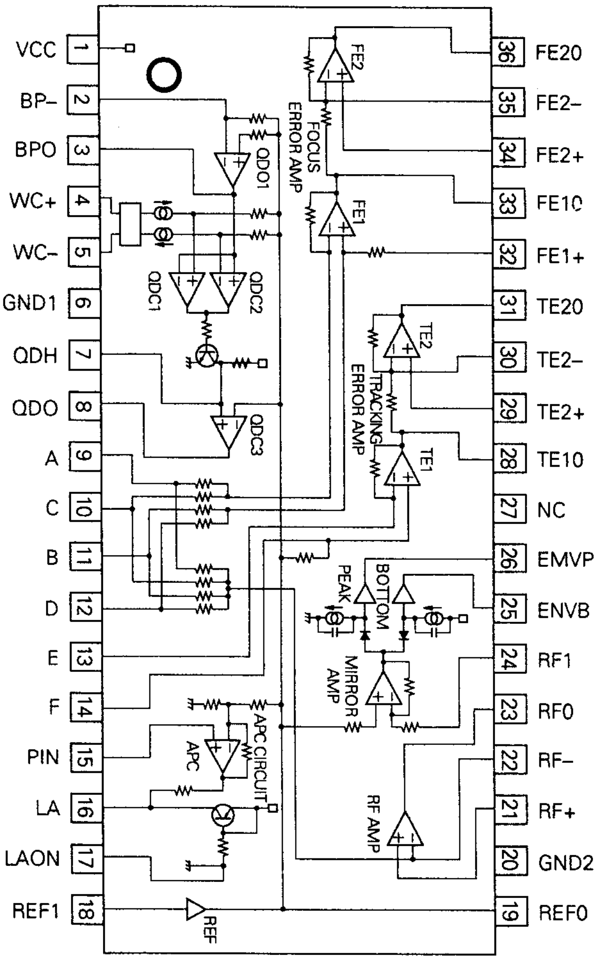

VCC 1
BP- 2
BPO 3
WC+ 4
WC- 5
GND1 6
QDH 7
QDO 8
A 9
C 10
B 11
D 12
E 13
F 14
PIN 15
LA 16
LAON 17
REF1 18
36 FE20
35 FE2-
34 FE2+
33 FE10
32 FE1+
31 TE20
30 TE2-
29 TE2+
28 TE10
27 NC
26 EMVP
25 ENVB
24 RF1
23 RFO
22 RF-
21 RF+
20 GND2
19 REFO
FE2
FOCUS ERROR AMP
FE1
QDO1
QDC1
QDC2
QDC3
TE2
TRACKING ERROR AMP
TE1
BOTTOM
PEAK
MIRROR AMP
APC
APC CIRCUIT
RF AMP
REF

Fig.8 : UPC2571GS BLOCK DIAGRAM

1) Automatic Power Control (APC)

The laser diode's junction voltage varies greatly with temperature ; causing large output variations in optical power. To avoid this, a monitor diode is used in a feedback circuit to keep the optical power constant. As two different manufacturer's laser diodes are used the LD current falls into two broad bands : approx. 40mA and approx. 60mA.

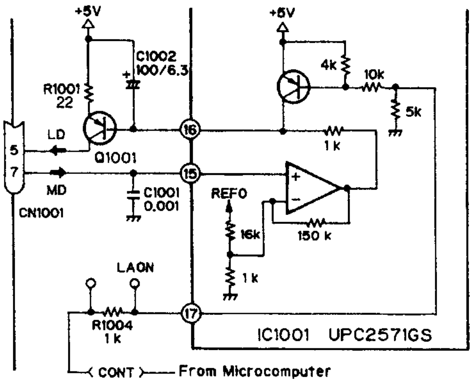

+5V
C1002
100/6.3
R1001
22
LD
Q1001
5
7
MD
CN1001
C1001
0.001
16
15
17
+5V
4k
10k
5k
1k
REFO
16k
1k
150 k
LAON
R1004
1k
IC1001 UPC2571GS
CONT
From Microcomputer

Fig.9 : APC CIRCUIT

2) RF Amplifier

This performs a simple summation of the photo-detector outputs A,B,C & D, amplifies, and equalizes to produce the RF signal at RFO. The RF eye pattern may be monitored here. The RFO OFFSET volume is used to ensure that the RFO waveform has the correct offset relative to the FOK threshold level inside the servo LSI UPD63700GF. The FOK signal is used in the focus close sequence, and during play to control the defect circuit inside the UPD63700GF.

The AC coupled RFO signal, RFI, is used by the UPD63700GF to generate the EFM signal which is used in turn by the DSP spindle CLV control sections.

For low frequency signals :

VRFO = (A+B+C+D) x (R1018+R1019)/10k = (A+B+C+D) x 6.22

The RFO waveform should have an amplitude of approx. 1.9Vpp, with it's upper envelope at +1.1V DC w.r.t. REFO.

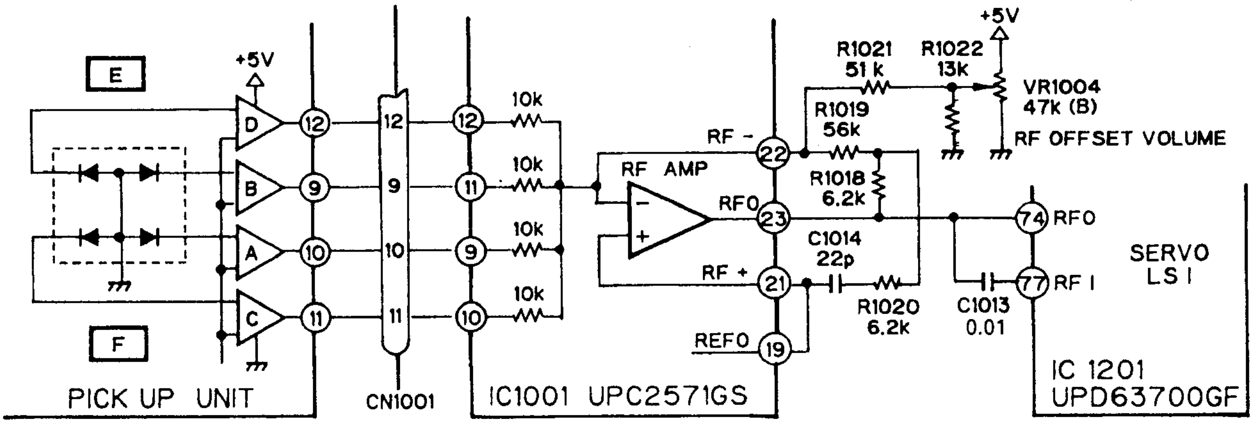

E
+5V
D
B
A
C
12
9
10
11
F
PICK UP UNIT
CN1001
10k
RF AMP
RF −
RFO
RF +
REFO
22
23
21
19
IC1001 UPC2571GS
R1021 51 k
R1022 13k
+5V
VR1004 47k (B)
RF OFFSET VOLUME
R1019 56k
R1018 6.2k
C1014 22p
R1020 6.2k
C1013 0.01
74 RFO
77 RF I
SERVO LS I
IC 1201 UPD63700GF

Fig.10 : RFO AMPLIFIER

3) Focus Error Amplifier

This produces a focus error signal used as the basis for the focus servo.

VFEY = ((A+C)-(B+D)) x 5 x (R1007//20k)/10k

= FE x 6.23 (FE = PU unit focus error)

The S-Curve at FEY should have an amplitude of approx. 1.9Vpp.

The second amplifier stage is also a low pass filter, fc=11kHz, and has a bias volume adjustment. This adjustment is used to vary the reference bias level of the focus servo loop and is adjusted to obtain an optimum eye pattern at RFO.

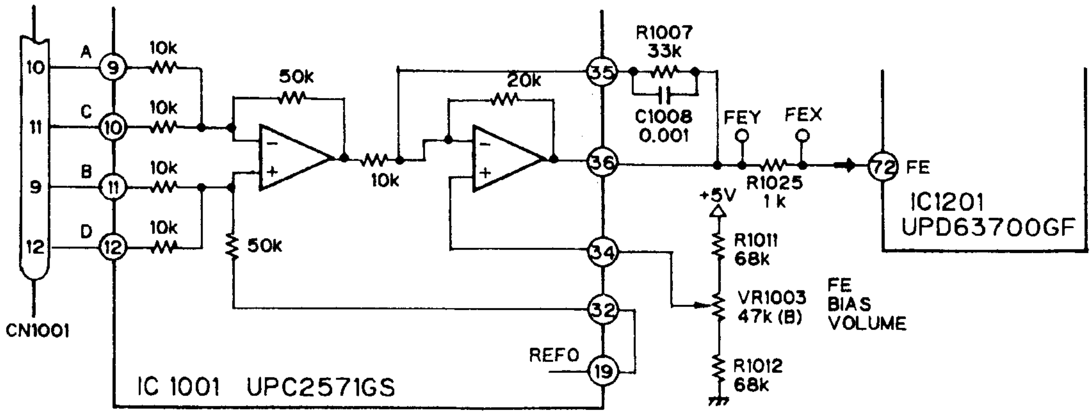

10
11
9
12
A
C
B
D
10k
50k
20k
10k
50k
35
36
34
32
19
R1007 33k
C1008 0.001
FEY
FEX
R1025 1 k
+5V
72 FE
IC1201 UPD63700GF
R1011 68k
VR1003 47k (B)
FE BIAS VOLUME
R1012 68k
REFO
CN1001
IC 1001 UPC2571GS

Fig.11 : FOCUS ERROR AMPLIFIER

4) Tracking Error Amplifier

This produces the tracking error signal used in the tracking servo loop.

$VTEY = (25 \times E) - (25 \times F \times 2 \times 10k / (T.BAL+10k))$

Normally, the sensitivity of E & F are the same and T.BAL=10k

=> $VTEY = 25 \times (E-F)$

If, however, the E and F sensitivities are different the T.BAL volume can be used to cancel out the unbalance. The offset adjustment TE OFFSET is to cancel any DC offsets from the photo-detectors or op-amps to ensure the reference bias for the servo loop is at zero. Maladjustment of either of these pre-sets will result in poor tracking performance and susceptibility to skipping.

For a typical unit, the TEY level should be approx. 1.8 Vpp.

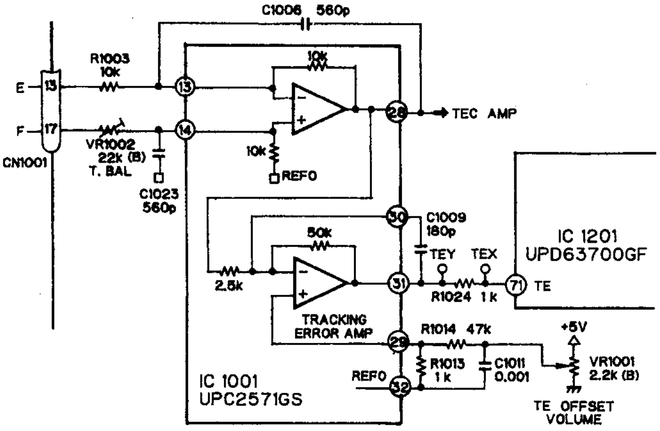

C1006 560p
R1003 10k
10k
E 13
F 17
CN1001
VR1002 22k (B) T. BAL
C1023 560p
10k
REFO
TEC AMP
C1009 180p
50k
2.6k
TEY TEX
R1024 1k
IC 1201 UPD63700GF
TE
TRACKING ERROR AMP
R1014 47k
+5V
R1013 1k
C1011 0.001
VR1001 2.2k (B)
REFO
IC 1001 UPC2571GS
TE OFFSET VOLUME

Fig.12 : TRACKING ERROR AMPLIFIER

5) Tracking Zero Crossing Amplifier

TEC1 is basically an amplified, AC coupled, version of the TEY waveform. It is used by the servo LSI IC1201, UPD63700GF to located the zero crossing points of the TEY signal to :

1) Determine how many tracks have been crossed during track jumping or a carriage move operation.
2) Determine in which direction the lens is moving when attempting to close tracking. This is used in the "tracking brake" circuit described later.

For signals in the range 500Hz - 5kHz :

$VTEC1 = R1005/R1006 \times (E-F) = 45.5 \times (E-F)$

Typically TEC1 is around 4.2Vpp, this means that the TEC1 signal level may be greater than the saturation limit of the op-amp and the signal will clip. However, since the servo LSI only uses the zero-crossing points, this is not critical.

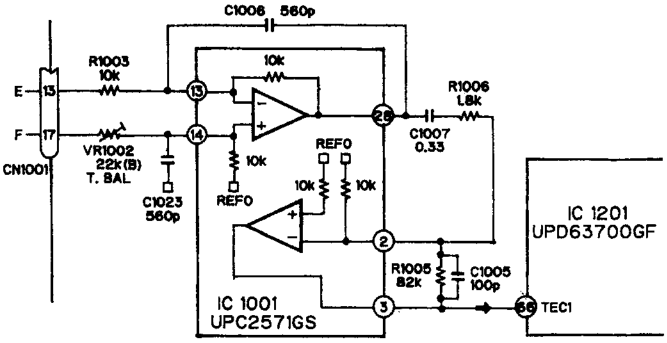

C1006 560p
R1003 10k
10k
E 13
F 17
CN1001
VR1002 22k(B) T. BAL
C1023 560p
10k
REFO
REFO
10k 10k
R1006 1.8k
C1007 0.33
IC 1201 UPD63700GF
R1005 82k
C1005 100p
TEC1
IC 1001 UPC2571GS

Fig.13 : TRACKING ZERO CROSSING AMPLIFIER

5.2 SERVO STAGE (UPD63700GF)

All the servo equalization & sequencing, such as focus closing, track jumping, carriage moving etc. are performed in this LSI, as well as all the DSP functions : data decoding, error protection, interpolation etc. The signals FE & TE are digitized and processed by the servo block to produce the focus, tracking & carriage drive signals, in a PWM format.

The RFI signal is converted to the EFM signal which is decoded by the DSP block to produce an audio signal ; during this process, a spindle servo error signal is also generated and used by the servo block to produce a spindle drive signal, again in PWM form.

The PWM waveforms are filtered, to remove the PWM carrier, amplified by the driver IC1401 XRA6797FP, and output to the corresponding actuators.

1) Focus Servo System

The main focus equalization takes place inside the UPD63700GF (figure 14). The equalizer response can be measured between FEX and FIN and has the shape shown in figure 15.

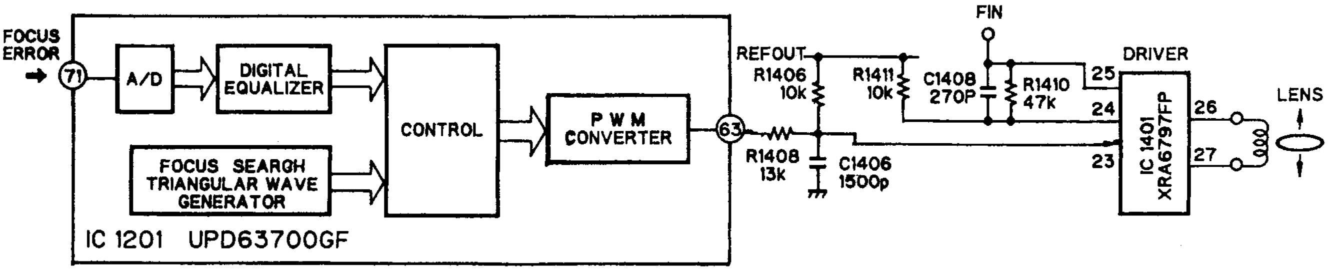

FOCUS ERROR
71
A/D
DIGITAL EQUALIZER
CONTROL
PWM CONVERTER
FOCUS SEARCH TRIANGULAR WAVE GENERATOR
IC 1201 UPD63700GF
63
REFOUT
R1406 10k
R1408 13k
C1406 1500p
R1411 10k
C1408 270P
FIN
R1410 47k
DRIVER
25
24
23
IC 1401 XRA6797FP
26
27
LENS

Fig.14 : FOCUS SERVO BLOCK DIAGRAM

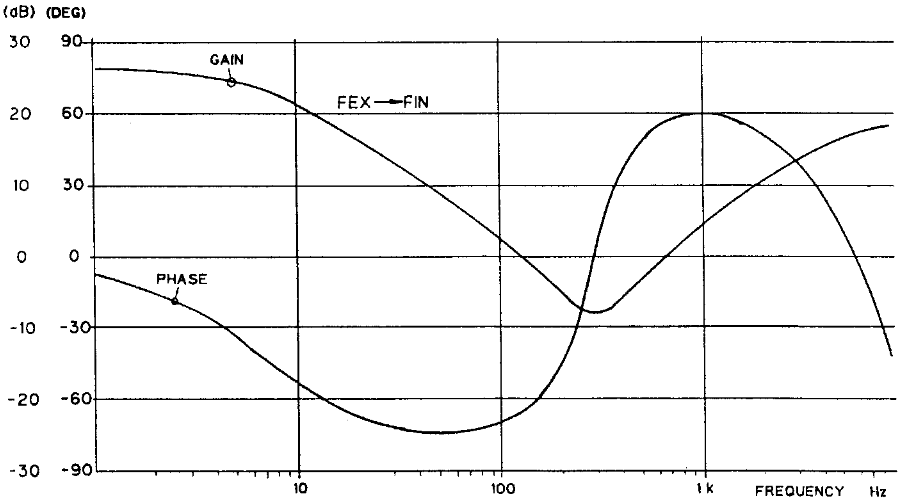


Fig.15 : FOCUS EQUALIZER

In order to smoothly close focus the lens must first be within approx. 5µm of the "just focused" position. This position is achieved by a focus search sequence. The lens is moved up and down using a triangular wave search voltage while the spindle motor is kicked and kept rotating at an appropriate speed. The servo LSI monitors the FE and RFO signals and, at an appropriate point, automatically closes focus.

The conditions for focus close are :

1) The lens is moving from a far to a near position relative to the disc,
2) FOK = HIGH (5V),
3) FZD (IC internal signal) was latched high and
4) FE = 0 (w.r.t. REFO).

When the focus servo closes, the servo LSI's serial data output port, XSO, will show a high-low transition. This is received by the microcomputer as an indication that the servo loop was closed and after about 25mS it begins monitoring the FOK output, via a LPF, to verify that focus is still closed ; in the event of FOK becoming low for an appreciable time, the microcomputer will take appropriate action.

The various signal levels which contribute to focus close are shown in figure 16, which shows the case where focus close has been inhibited.

In TEST MODE, using FOCUS CLOSE MODE 1, conditions 2 & 3 can be inhibited to allow the S-Curve, focus search voltage and the actual lens movement to be observed at ease.

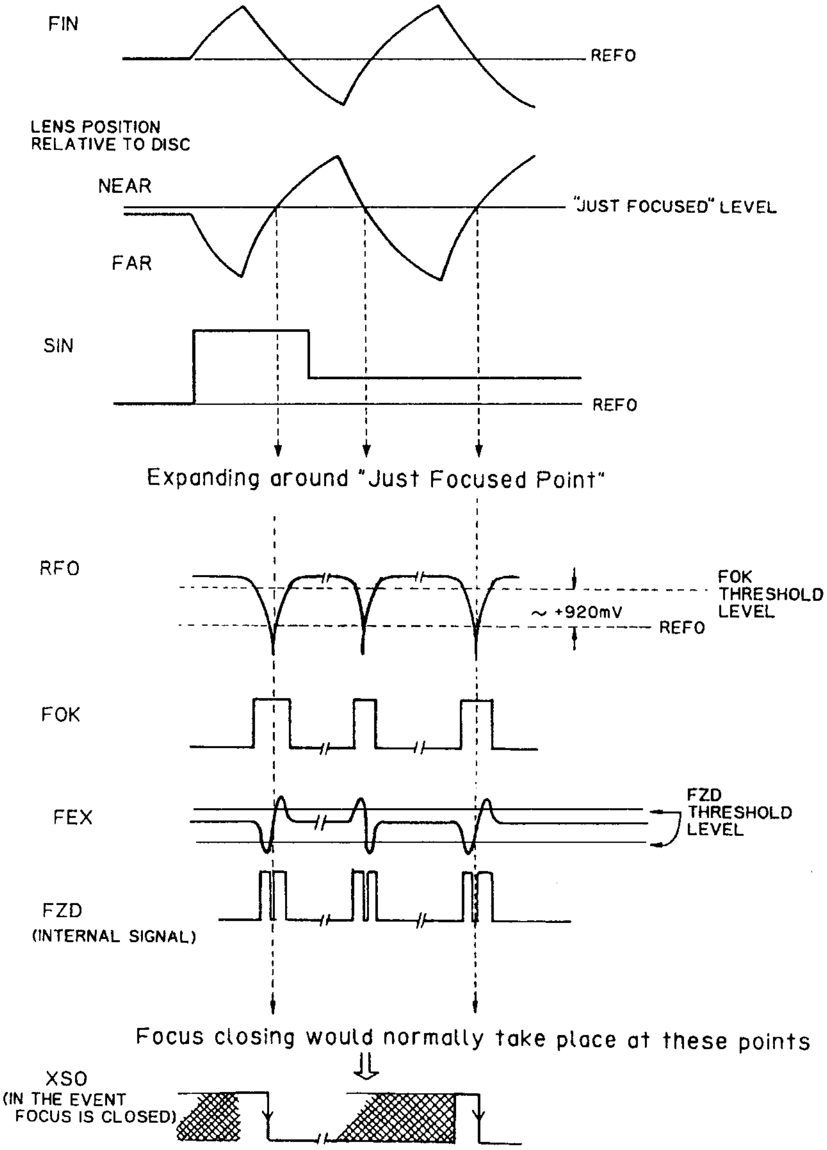

FIN
REFO
LENS POSITION RELATIVE TO DISC
NEAR
"JUST FOCUSED" LEVEL
FAR
SIN
REFO
Expanding around "Just Focused Point"
RFO
FOK THRESHOLD LEVEL
~ +920mV
REFO
FOK
FEX
FZD THRESHOLD LEVEL
FZD (INTERNAL SIGNAL)
Focus closing would normally take place at these points
XSO (IN THE EVENT FOCUS IS CLOSED)

Fig.16 : FOCUS CLOSING SEQUENCE

a) FOK CIRCUIT

The FOK circuit inside the servo LSI compares the lower envelope of the RFO signal with a threshold level fixed by the microcomputer. Should the envelope level fall below this FOK level then FOK becomes high. This is used during focus close as stated and also during play to control a defect circuit, which switches the focus & tracking servos into a hold mode should the RFO envelope become disrupted by dirt, grease etc, thus increasing the player's defect response (figure 17).
The FOK threshold is approx. +920mV w.r.t. REFO. It is for this reason that the upper envelope should be adjusted to +1.1V DC w.r.t. REFO.

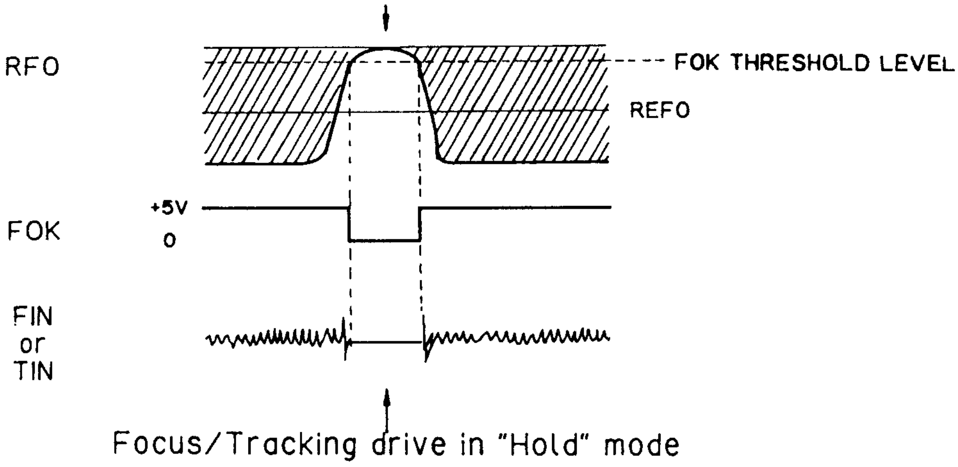

RFO
FOK THRESHOLD LEVEL
REFO
+5V
0
FOK
FIN
or
TIN
Focus/Tracking drive in "Hold" mode

Fig.17 : DEFECT CIRCUIT

b) FZD CIRCUIT

The FZD circuit inside the servo IC compares the absolute value of the FE signal to a threshold value and outputs a high/low signal which is then used in the focus close sequence as stated.
At power on, the microcomputer switches the laser diode off and reads the value of the FE bias via the servo LSI's A/D port. The FZD threshold is set 200mV above this bias level.

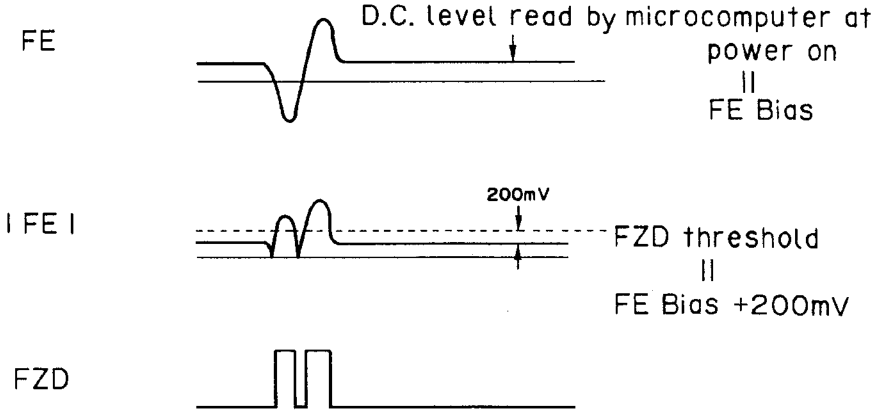

FE
D.C. level read by microcomputer at power on
||
FE Bias
| FE |
200mV
FZD threshold
||
FE Bias +200mV
FZD

Fig.18 : FZD CIRCUIT

2) Tracking Servo System

The main tracking equalization takes place inside the UPD63700GF (figure 19). The equalizer response can be measured between TEX and TIN and will have the shape shown in figure 20.

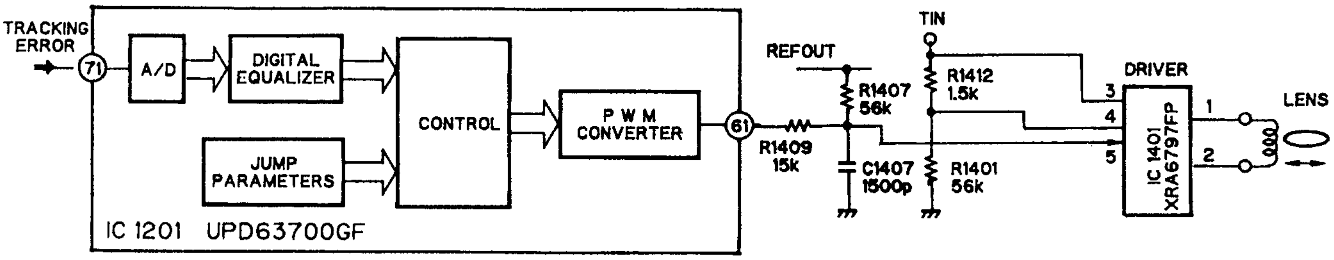

TRACKING ERROR
71
A/D
DIGITAL EQUALIZER
JUMP PARAMETERS
CONTROL
P W M CONVERTER
61
IC 1201 UPD63700GF
REFOUT
R1407 56k
R1409 15k
C1407 1500p
TIN
R1412 1.5k
R1401 56k
DRIVER
3
4
5
IC 1401 XRA6797FP
1
2
LENS

Fig.19 : TRACKING SERVO BLOCK DIAGRAM

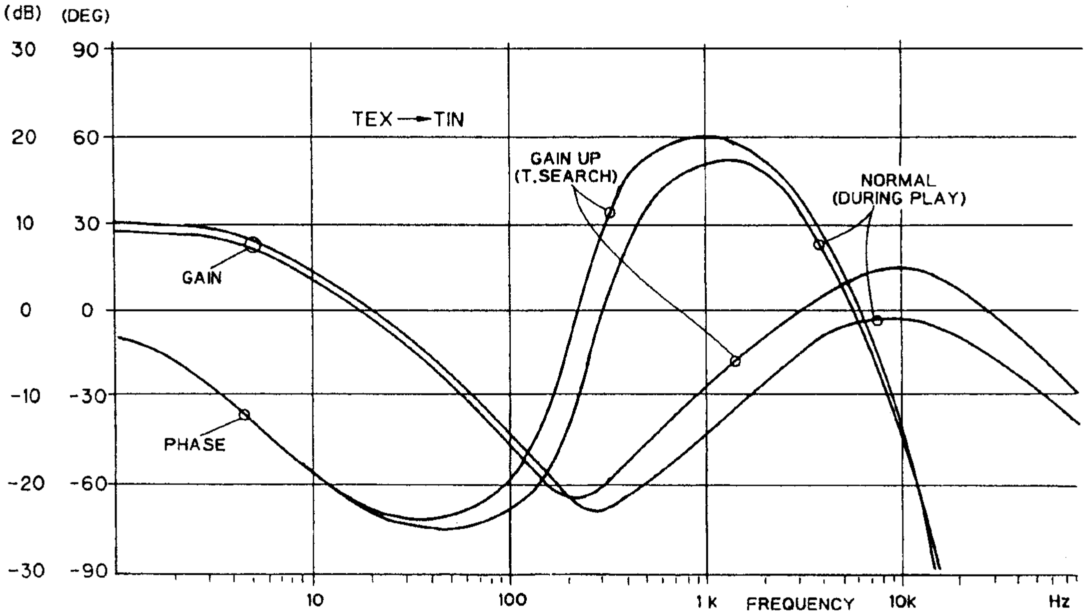


Fig.20 : TRACKING EQUALIZER

a) Track Jumping

Track jumping is performed automatically by the servo LSI upon receipt of the appropriate command from the microcomputer. The present microcomputer is programmed to use 1,4,10 & 32 track jump commands to achieve searching. The 32 track jump command may be used in pairs (64 tracks) or triplets (100 track) as required. In TEST MODE the 1,4,10,32 & 100 track jump and carriage move sequences may be observed by selecting the appropriate mode.

Note that the number of tracks jumped is controlled by setting an internal counter to half the total value and then counting this down using the zero crossing edges of TEC1. Once the counter is at zero, a brake pulse of fixed duration is output to bring the lens to a halt; allowing tracking to be closed and normal play to continue.

For a fixed period of time after a multi-track jump has been performed, a "tracking brake" circuit is activated in conjunction with a "gain-up" equalizer to ensure that the servo achieves stabilization before entering normal play.

Manual track search, in normal mode, uses a group of single track jumps to achieve FWD/REV at approx. ten times normal play speed.

The figures 21 & 22 show the timing charts for the single-track jump and multi-track jump commands.

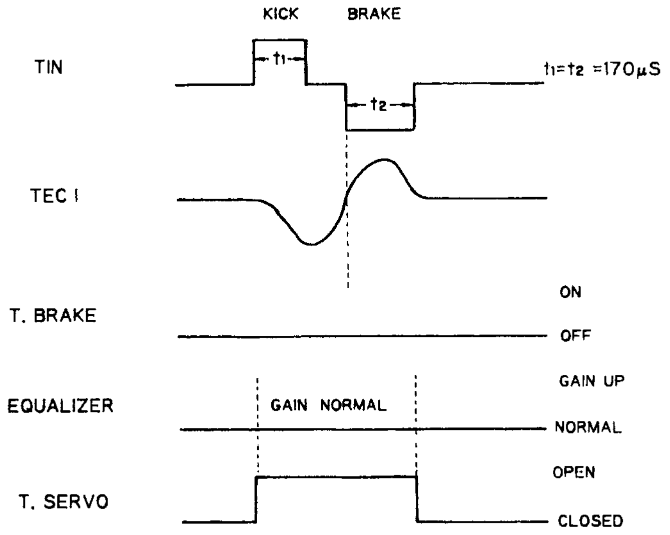

KICK
BRAKE
TIN
t1
t2
t1=t2 =170μS
TEC I
T. BRAKE
ON
OFF
EQUALIZER
GAIN NORMAL
GAIN UP
NORMAL
T. SERVO
OPEN
CLOSED

Fig.21 : SINGLE TRACK JUMP

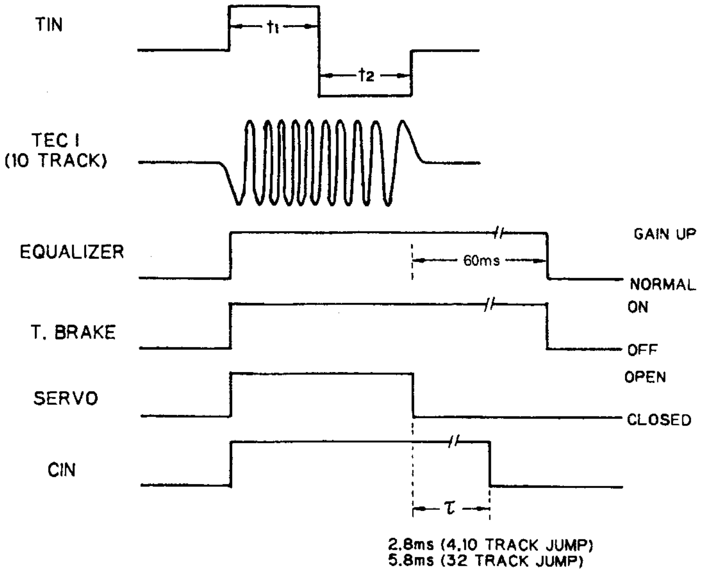
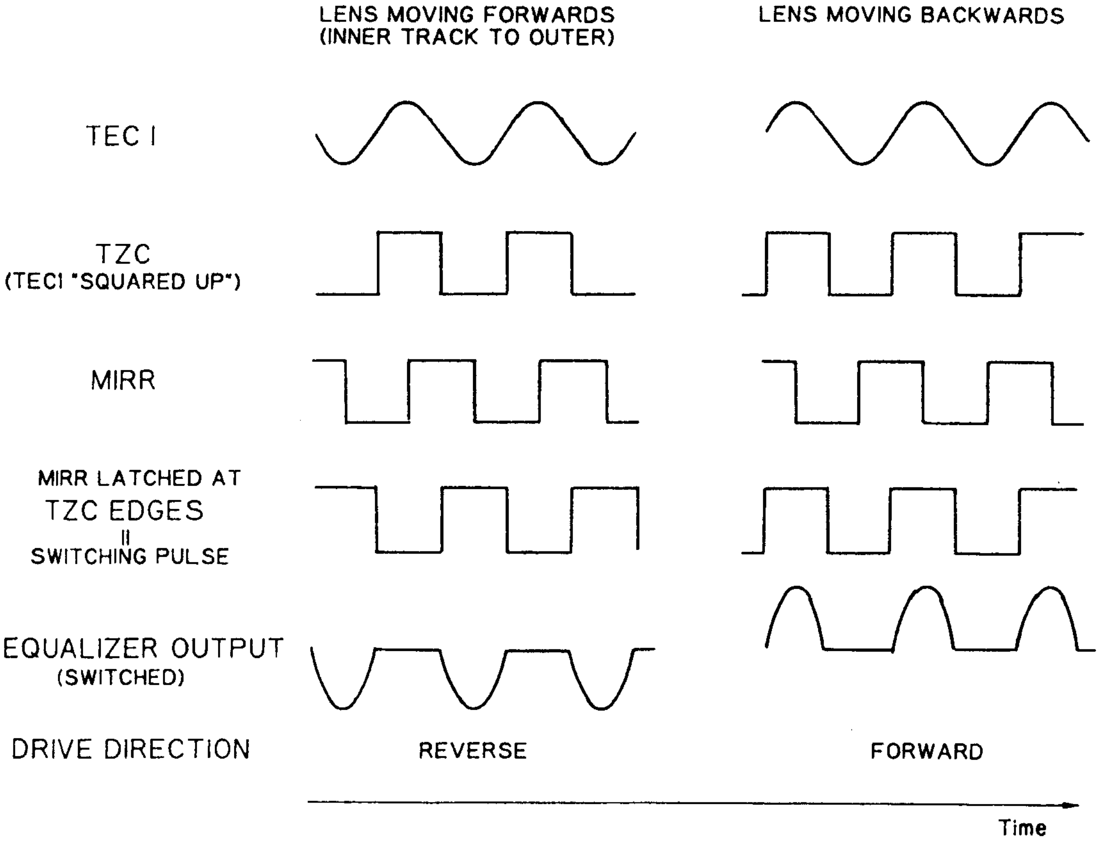

TIN
t1
t2
TEC I
(10 TRACK)
EQUALIZER
60ms
GAIN UP
NORMAL
T. BRAKE
ON
OFF
SERVO
OPEN
CLOSED
CIN
τ
2.8ms (4,10 TRACK JUMP)
5.8ms (32 TRACK JUMP)

Fig.22 : MULTI TRACK JUMP

b) Tracking Brake Circuit (Figure 23)

This relies on determining which direction the lens is moving and only outputting the portion of the drive waveform which acts to oppose this motion. Direction of motion is deduced from TEC1 and the MIRR signal and knowledge of their phase relation.


LENS MOVING FORWARDS
(INNER TRACK TO OUTER)
LENS MOVING BACKWARDS
TEC I
TZC
(TEC1 "SQUARED UP")
MIRR
MIRR LATCHED AT
TZC EDGES
॥
SWITCHING PULSE
EQUALIZER OUTPUT
(SWITCHED)
DRIVE DIRECTION
REVERSE
FORWARD
Time

Note : Equalizer output assumed to have same phase as TEC1.

Fig.23 : TRACKING BRAKE CIRCUIT

c) MIRROR Circuit

The MIRR circuit indicates if the laser beam is on or off track.

MIRR = 'H' => off track, MIRR = 'L' => on track.

MIRR is generated by detecting the upper and lower envelopes of the RFO waveform and producing a difference signal which is then compared with a peak-held version of itself to determine if the envelope size has dropped below a certain percentage. If so, this is assumed to be due to the beam going off-track ; in practice dirt on the disc can also give the same effect (see figure 24).

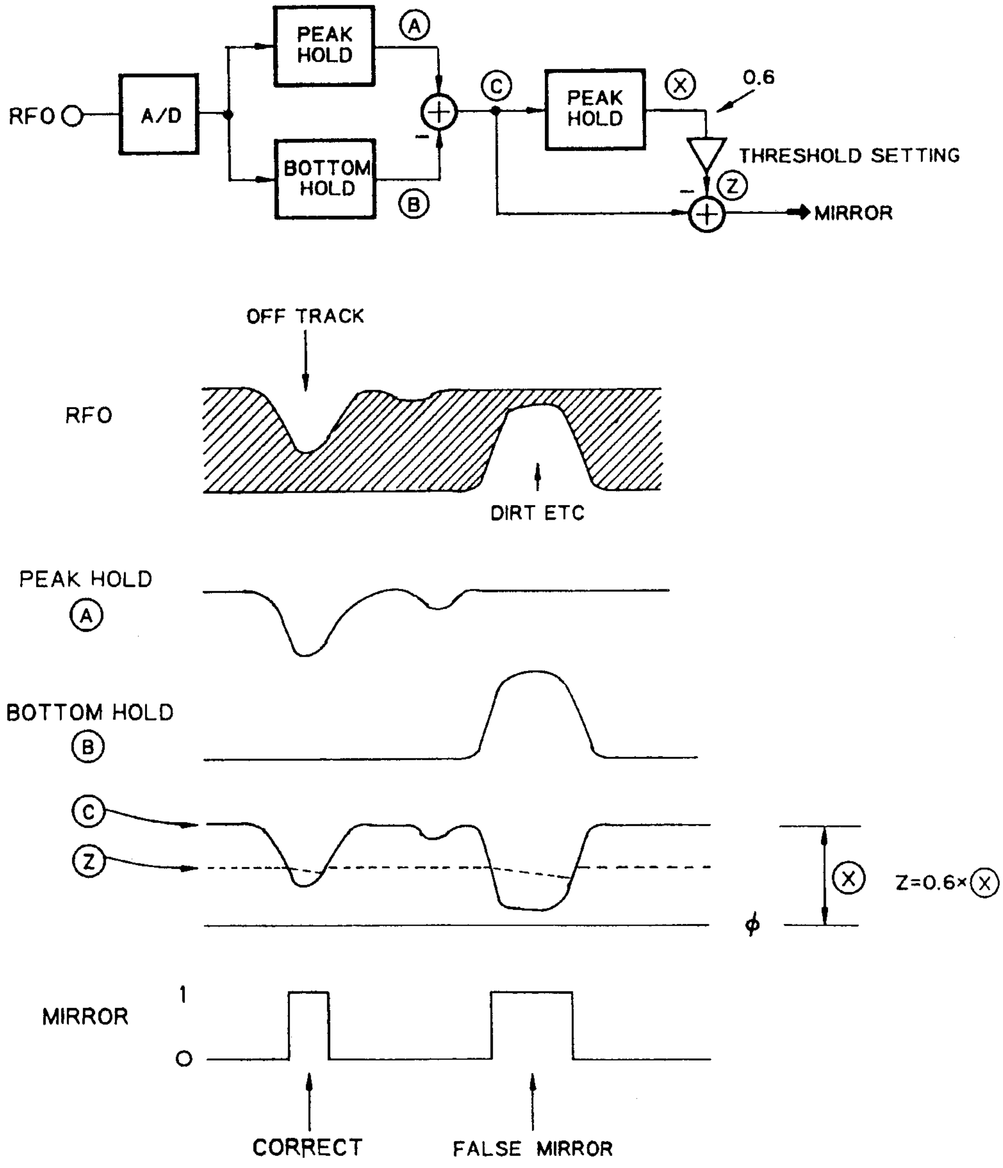

RFO
A/D
PEAK HOLD
BOTTOM HOLD
Ⓐ
Ⓑ
Ⓒ
PEAK HOLD
Ⓧ
0.6
THRESHOLD SETTING
Ⓩ
MIRROR
OFF TRACK
RFO
DIRT ETC
PEAK HOLD
Ⓐ
BOTTOM HOLD
Ⓑ
Ⓒ
Ⓩ
Ⓧ
Z=0.6×Ⓧ
ϕ
MIRROR
1
0
CORRECT
FALSE MIRROR

Fig.24 : MIRROR CIRCUIT & SIGNAL DIAGRAM

3) Carriage Servo System

The carriage servo system takes it's input from the low frequency component of the tracking equalizer output. This is amplified and equalized, and the output fed to the carriage motor via the PWM converter, LPF and driver IC. The gain of the equalizer is set so that when the lens is offset from it's center by a set amount the voltage at the carriage motor is enough to overcome friction and move the carriage forward.

Because the carriage motor will only begin moving when the applied voltage is great enough to overcome friction the drive voltage is cut-off inside the servo LSI until it reaches an appropriate level ; thus saving on wasted power dissipation.

Due to eccentricity of the disc etc. the threshold level may be crossed several times before the carriage assembly actually moves. This can result in a series of pulses being applied to the carriage motor.

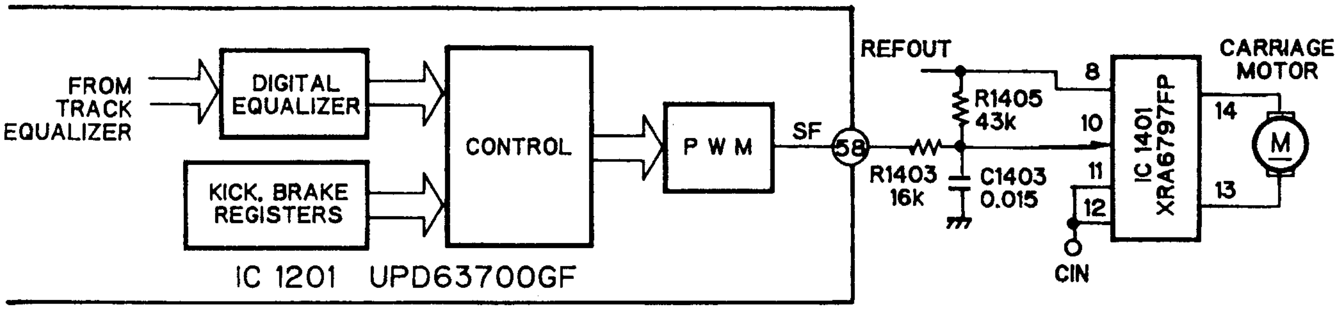

FROM TRACK EQUALIZER
DIGITAL EQUALIZER
KICK, BRAKE REGISTERS
CONTROL
P W M
SF
58
IC 1201 UPD63700GF
REFOUT
R1405 43k
R1403 16k
C1403 0.015
8
10
11
12
CIN
IC 1401 XRA6797FP
14
13
CARRIAGE MOTOR
M

Fig.25 : CARRIAGE SERVO CIRCUIT

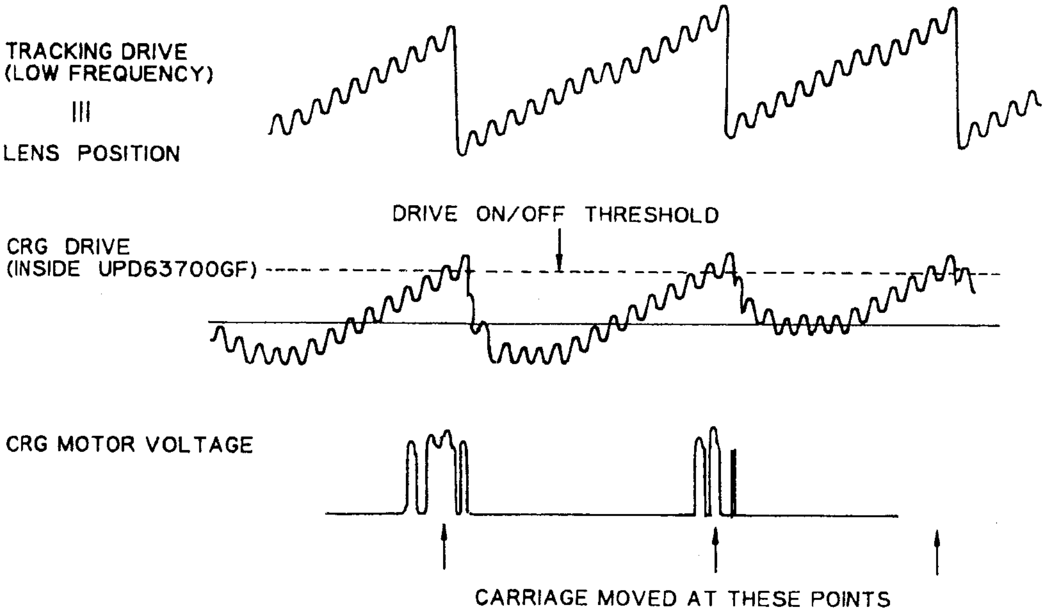


Fig.26 : CARRIAGE WAVEFORM

4) Spindle Servo

The spindle servo has a number of different modes :

(i) Kick : Used at set-up to bring the spindle up to speed from stand-still.

(ii) Offset : This is used i) At set-up, after spindle kick and before AGC has finished.
ii) During play if focus is suddenly disrupted.

(iii) Adaptive Servo : This is the CLV mode which ensures that the linear velocity of the disc as seen by the laser spot is kept constant. During play, a timing signal is extracted from the EFM signal and used to generate speed and phase error signals. These error signals are summed and fed into a servo equalizer to produce a drive signal via the PWM converter.

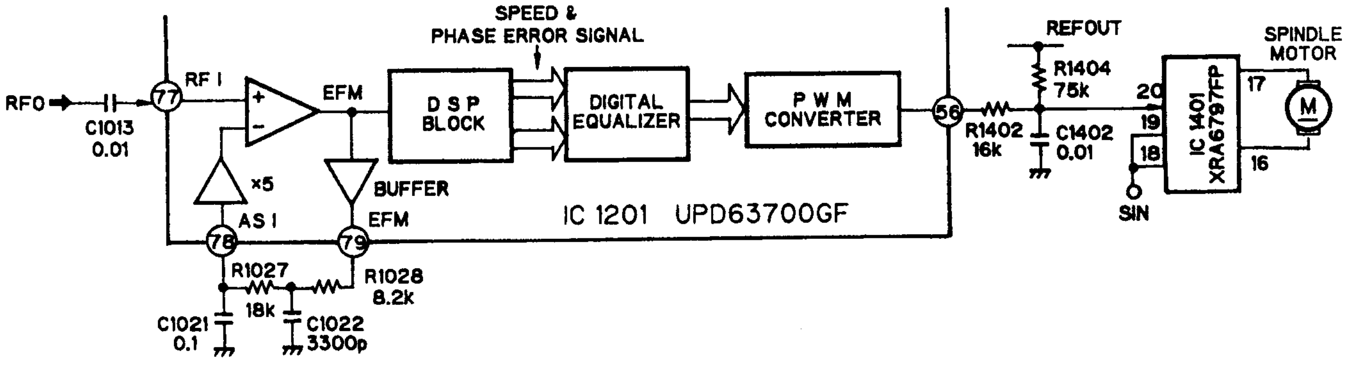
(iv) Brake : This is used to bring the disc to a stop quickly, for ejection or when CD source is deselected or for any other reason. The servo LSI puts out a brake level and monitors the EFM signal. When the longest pattern in the EFM signal is longer than a fixed amount an internal flag is set. By monitoring this flag the microcomputer can judge when the disc has stopped and proceed to eject etc. If this flag is not set within a certain time limit the servo is switched to STOP mode and eject is implemented after a wait period.

(v) Stop : This occurs at power on or during disc eject. The spindle motor voltage is zero.

(vi) Rough : This is used in normal mode to control the linear velocity of the disc when the carriage is being moved for fast access. A speed signal is deduced from the EFM waveform and input to the spindle equalizer. This mode should be used in TEST MODE to perform the grating adjustment.

a) EFM Comparator

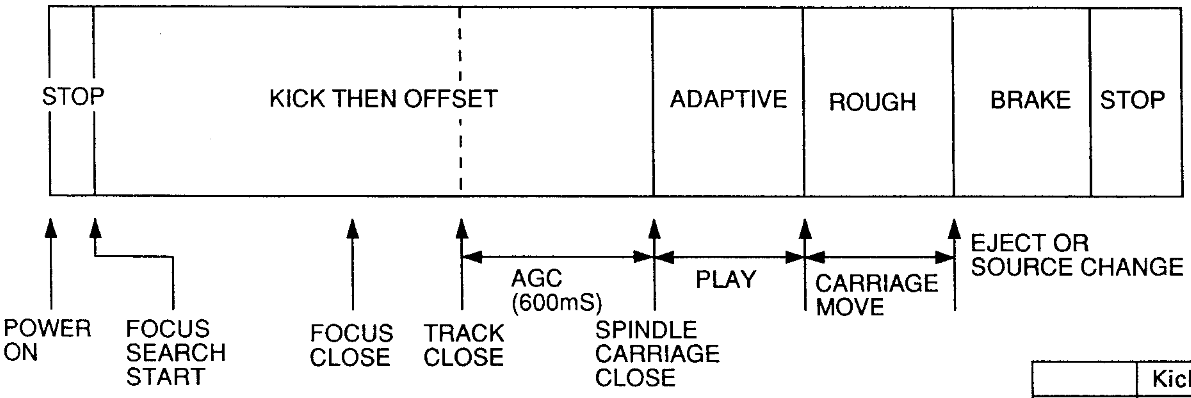
This circuit 'squares' up the analog RF signal into a digital EFM signal. In order to ensure minimum errors it is necessary to use a feedback circuit to match the DC level of the threshold to the center of the RF waveform. This circuit (shown in the spindle servo block diagram) uses the fact that the EFM signal should have no DC component. By feeding back the EFM signal's DC level the threshold level changes until the DC level is zero and the threshold, by definition, is at the exact center of the RFI waveform. The filtering in the feedback has been adjusted to ensure minimum error.


SPEED &
PHASE ERROR SIGNAL
RFO
C1013
0.01
77
RF I
EFM
D S P
BLOCK
DIGITAL
EQUALIZER
P W M
CONVERTER
56
REFOUT
R1404
75k
R1402
16k
C1402
0.01
20
19
18
SIN
IC 1401
XRA6797FP
17
16
SPINDLE
MOTOR
M
×5
AS I
BUFFER
EFM
IC 1201 UPD63700GF
78
79
R1027
18k
R1028
8.2k
C1021
0.1
C1022
3300p

(EFM Compalator Circuit)

Fig.27 : SPINDLE CIRCUIT

● Normal Mode


STOP
KICK THEN OFFSET
ADAPTIVE
ROUGH
BRAKE
STOP
POWER ON
FOCUS SEARCH START
FOCUS CLOSE
TRACK CLOSE
AGC (600mS)
SPINDLE CARRIAGE CLOSE
PLAY
CARRIAGE MOVE
EJECT OR SOURCE CHANGE

	Kick Time
12cm	800mS
8cm	300mS

● Test Mode

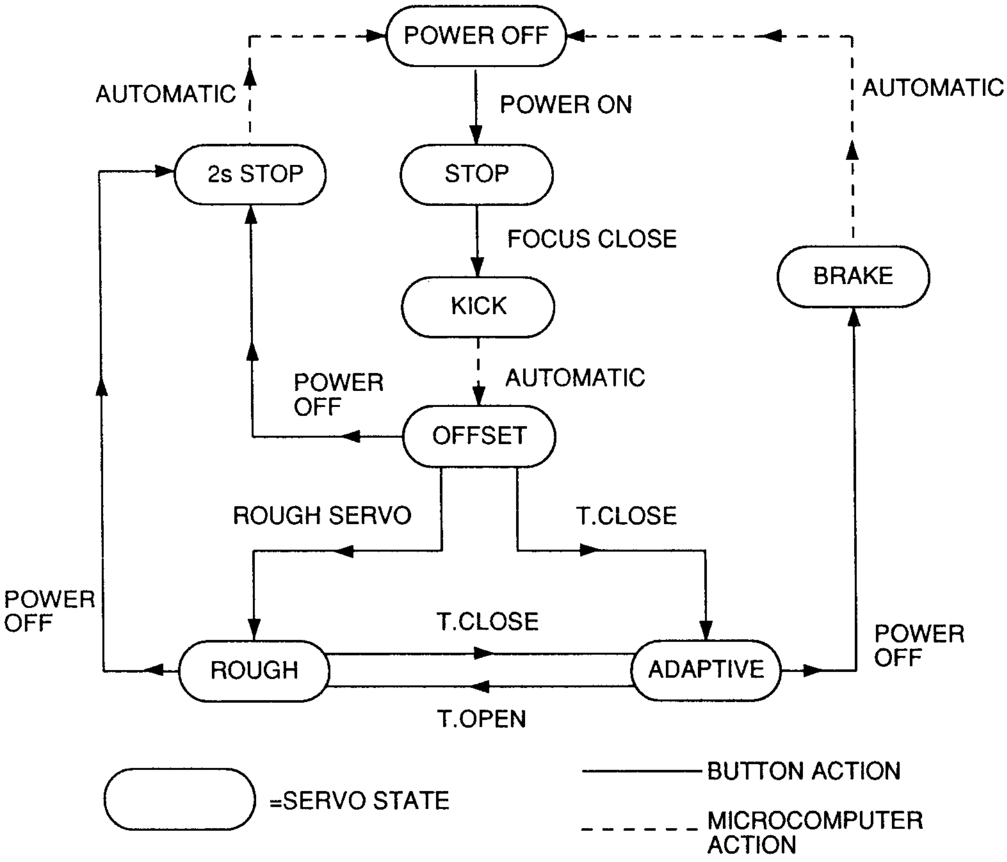

POWER OFF
AUTOMATIC
POWER ON
AUTOMATIC
2s STOP
STOP
FOCUS CLOSE
BRAKE
KICK
POWER OFF
AUTOMATIC
OFFSET
ROUGH SERVO
T.CLOSE
POWER OFF
T.CLOSE
ROUGH
ADAPTIVE
POWER OFF
T.OPEN
=SERVO STATE
BUTTON ACTION
MICROCOMPUTER ACTION

Fig.28 : SPINDLE SERVO MODES

5) Automatic Gain Control (AGC)

The servo LSI UPD63700GF contains a new function which allows the microcomputer to automatically adjust the gain of the focus and tracking servos every time a new disc is inserted or the CD source is selected. The block diagram of the AGC circuit is shown in figure 29. Basically, a small disturbance signal is inserted into the servo loop at a fixed frequency and the response of the loop is measured via the filtered signals G1 and G2. For a properly adjusted servo loop the amplitudes of G1 and G2 should be equal. The microcomputer reads in these values, does a simply calculation and adjusts the loop gain appropriately.

In order to achieve a high degree of accuracy this adjustment is performed a number of times.

As long as there is power supplied to the microcomputer it remembers the previous adjustment point and uses this as a starting point. Thus, should the system degrade with time (actuator sensitivity, dirt build-up, circuit degradation etc.) the microcomputer can follow this trend and keep the loop gain optimized.

If power to the microcomputer is removed, it forgets the previous adjustment point and assumes a default value. At shipping the CD player will be within 5dB of this default and no problems should occur. For an older player however this is not so and it is possible that servo closure may not take place immediately. In this case, the microcomputer adjusts the gain 'blind', searching for a stable point.

In TEST MODE, the result of the AGC can be monitored. Once tracking close (with AGC) has been performed the set can be made to display the present value of the gain block. The default value is displayed as '20', which is the value a typical PU unit, PCB & test disc would result in. If for some reason the loop gain had dropped by, say, 6dB (1/2 the typical value) then the gain block will be adjusted during AGC to twice it's default value ; resulting in a gain of '40'. Similarly a set with a loop gain twice the typical will display '10' as the present gain.

Using this, it is possible to 'measure' the loop gain of the servo without the need for any instrumentation. The players shipped from the factory are checked with a test disc so that the value of the gain block after AGC is within the range 11 - 45.

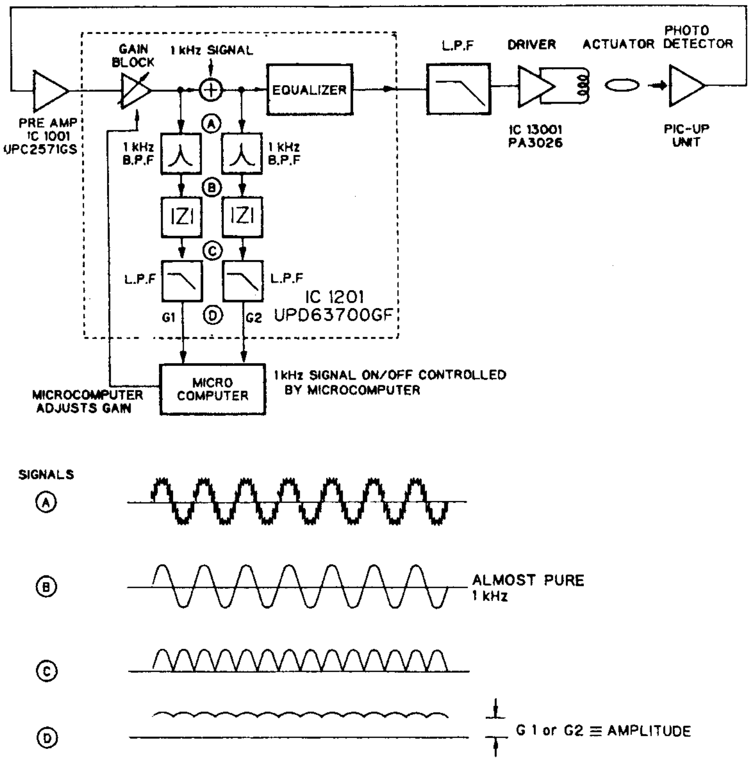

GAIN BLOCK
1 kHz SIGNAL
EQUALIZER
L.P.F
DRIVER
ACTUATOR
PHOTO DETECTOR
PRE AMP
IC 1001
UPC2571GS
A
1 kHz B.P.F
1 kHz B.P.F
B
|Z|
|Z|
C
L.P.F
L.P.F
G1
D
G2
IC 1201
UPD63700GF
IC 13001
PA3026
PIC-UP UNIT
MICRO COMPUTER
MICROCOMPUTER ADJUSTS GAIN
1kHz SIGNAL ON/OFF CONTROLLED BY MICROCOMPUTER
SIGNALS
A
B
ALMOST PURE 1 kHz
C
D
G 1 or G2 ≡ AMPLITUDE

Fig.29 : AGC BLOCK DIAGRAM

5.3 Power Source Configuration

The power source for this system consists of seven separate sources which are the SVC (5.2V), VDD (5.0V), VLED (8.5V), 5VA (5.0V), DAC5 (5.0V), VD (8.6V), and POW5 (5.0V) power sources.

SVC: Power source for SRAM (IC1702). Even if BU is cut off by diode switching, the charge voltage of C1704 (electrolytic capacitor) maintains SRAM's power supply for one day (minimum 2 V) and saves data of the ITS and title memories.

VDD: Power source for the microcomputer (IC1701). Constantly outputs power as long as the BU created by the IC power source PAJ002A is connected.

VLED: Power supply for the two LEDs for the elevation (vertical movement) sensor and disc sensor. The LEDs light during mechanical movement, and are controlled by LOAD.

5VA: Consists of power source for IC1001, IC1201 and the LD of the PU unit, plus the regulator circuit for IC1401 (XRA6797FP) and an external transistor. The 5VA power supply outputs power when VD is turned on.

DAC5: Consists of the IC1601 (D/A converter IC) and audio midpoint voltage, plus regulator IC from VD. The DAC5 power supply outputs power when VD is turned on.

VD: Main power supply for the system. Power is output when POW5, having switched VDD by POWER, reaches the reference voltage and is triggered.

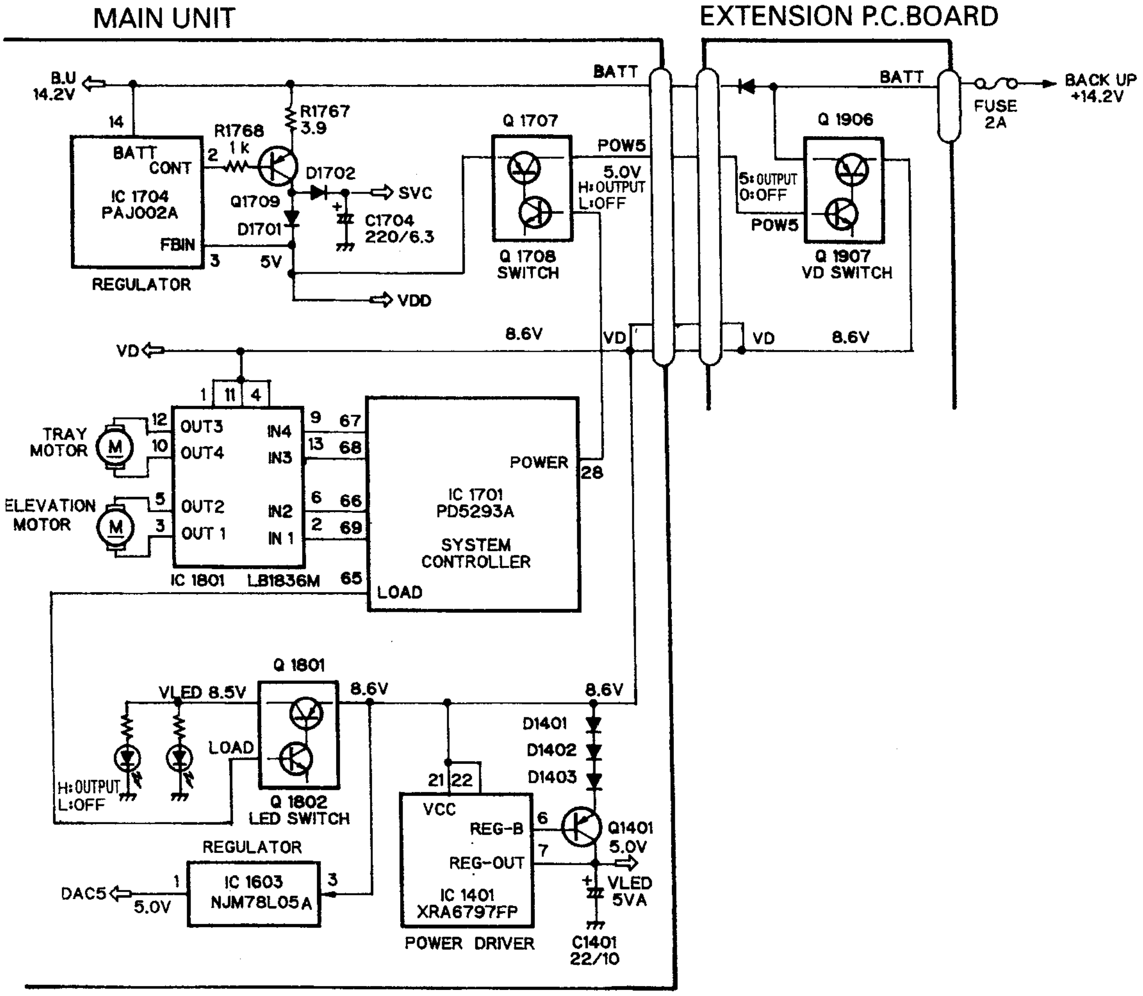

MAIN UNIT
EXTENSION P.C.BOARD
B.U 14.2V
14
BATT CONT
IC 1704 PAJ002A
FBIN
REGULATOR
R1768 1k
R1767 3.9
Q1709
D1702
D1701
SVC
C1704 220/6.3
5V
VDD
BATT
Q 1707
POW5 5.0V
H:OUTPUT L:OFF
Q 1708 SWITCH
8.6V
VD
BATT
FUSE 2A
BACK UP +14.2V
Q 1906
5:OUTPUT 0:OFF
POW5
Q 1907 VD SWITCH
VD 8.6V
TRAY MOTOR
ELEVATION MOTOR
M
OUT3 OUT4 OUT2 OUT 1
IN4 IN3 IN2 IN 1
1 11 4 12 10 5 3 9 13 6 2
67 68 66 69 65
IC 1801 LB1836M
POWER 28
IC 1701 PD5293A
SYSTEM CONTROLLER
LOAD
Q 1801
VLED 8.5V
8.6V
LOAD
H:OUTPUT L:OFF
Q 1802 LED SWITCH
REGULATOR
DAC5 5.0V
IC 1603 NJM78L05A
1 3
21 22
VCC
REG-B 6
REG-OUT 7
IC 1401 XRA6797FP
POWER DRIVER
D1401 D1402 D1403
Q1401
5.0V
VLED 5VA
C1401 22/10

Fig.30

5.4 Mechanical Function

1) Elevation (Figure 31)

When BU is turned on, the elevator moves upward until RSTP becomes L. The elevator stops at L. This is the 6th position (reset position). While counting the number of L of TSEL, the elevator subsequently transfers to the position of the requested number of discs (place where TSEL is L). The TSEL waveform is detected by LED and photo transistor. MAG become L when the magazine is inserted. If there is no magazine, MAG becomes H. Even after magazine eject, the mechanism constantly detects the reset position and stops here.

2) Tray extension and retreat (Figure 32)

The series of movements consisting of storing the tray in the magazine, extending and retreating the tray, and completion of clamping is determined by the microcomputer according to the DSP and TRP waveforms. The motors are driven by the 2-circuit motor drivers IC1801 (LB1836M) for locomoting the elevator and trays. Forward and reverse are carried out by drive instructions from the microcomputer through a combination of H and L of four lines (I1, I2, I3, I4).

3) Disc detection (Figure 33)

DSP is not only used for the previously mentioned extension and retreat of trays, but is also used for timing of decisions of whether the tray contains a disc or not, and whether the disc is a 12 or 8 cm disc. A series of disc detection operations are carried out while trays are pulled out of the magazine. For disc detection, an LED and photo transistor are provided above and below the tray. Presence of the disc is determined according to whether the light passes through the tray (disc waveform is L) or is blocked by the disc (disc waveform is H).

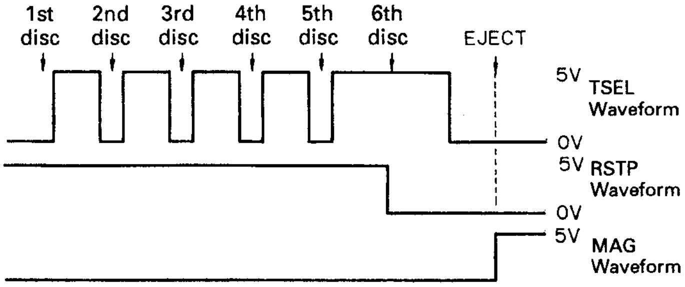


Fig.31

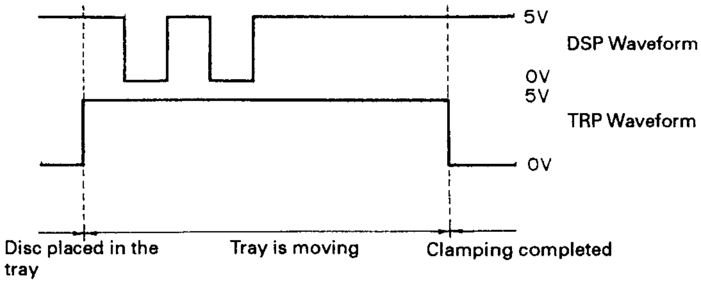


Fig.32

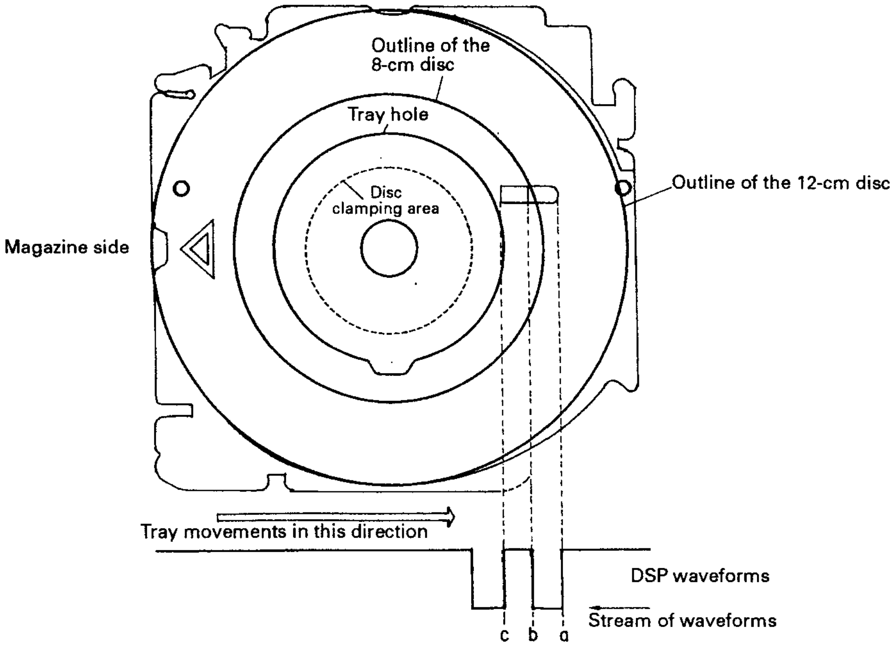


Fig.33

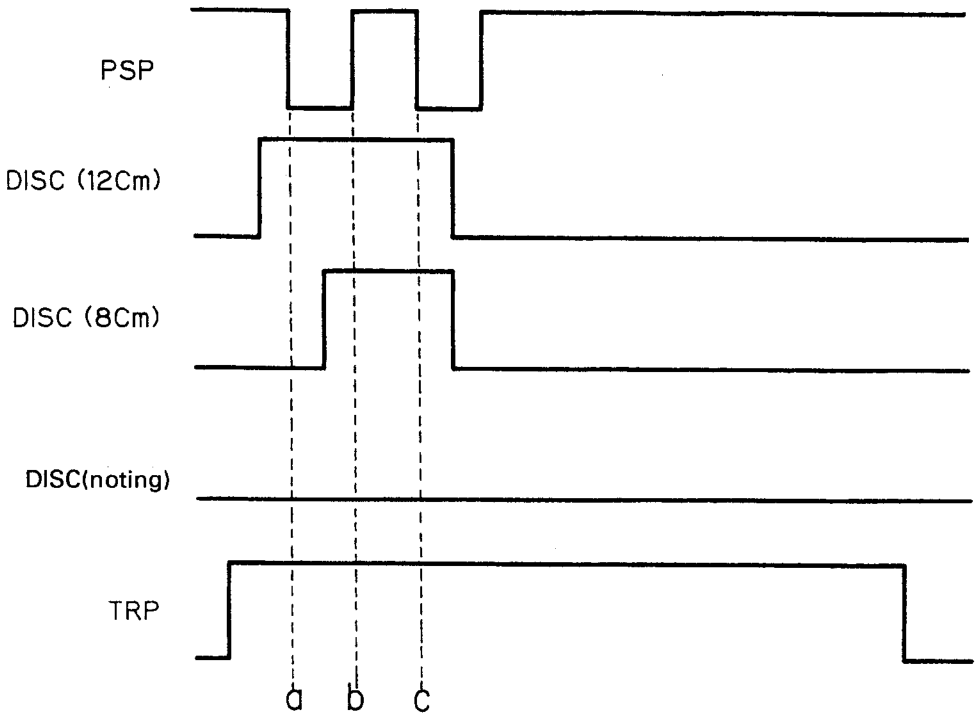


Fig.34

The flow of the waveform is opposite that of the previously mentioned DSP waveform.

Disc waveform is continuously detected during the periods of a-b and b-c:
If L is detected at least once, that period is L.
If L is not detected at least once, that period is H.

	a-b	b-c
12Cm	H	H
8Cm	L	H
Disc (nothing)	L	L

However, regardless of whether a-b is H or L, if b-c is L, all trays are determined to be empty.

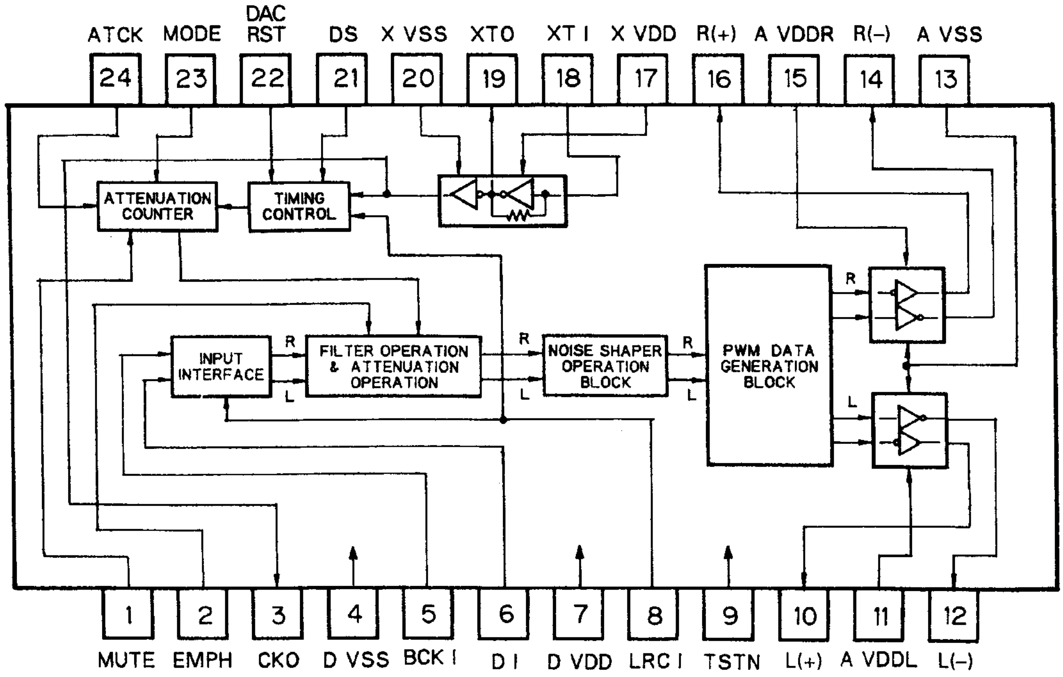
● ICs

● Pin Functions (SM5874AM)

Pin No.	Pin Name	I/O	Function and Operation
1	MUTE	I	Mode H: Soft mute ON/OFF Mode L: Attenuator level DOWN/UP
2	EMPH	I	De-emphasis ON/OFF terminal
3	CKO	O	Oscillation output clock
4	DVSS		Digital GND (0V)
5	BCKI	I	Input data bit clock
6	DI	I	Serial data input
7	DVDD		Digital VDD (5V)
8	LRCI	I	Input data sample rate (fs) clock
9	TSTN	I	Test
10	L(+)	O	Lch analogue output (+)
11	AVDDL		Analogue VDD
12	L(–)	O	Lch analogue output (-)
13	AVSS	I	Analogue VSS
14	R(–)	O	Rch analogue output (-)
15	AVDDR		Analogue VDD
16	R(+)	O	Rch analogue output (+)
17	XVDD		Crystal VDD (5V)
18	XTI	I	Oscillation input
19	XTO	O	Oscillation output
20	XVSS		Crystal VSS (0V)
21	DS	I	Normal / high-speed play mode select
22	DACRST	O	Reset output
23	MODE	I	Soft mute / attenuator mode select
24	ATCK	I	Attenuator level clock

IC's marked by are MOS type.*
Be careful in handing them because they are very liable
to be damaged by electrostatic induction.

*SM5874AM

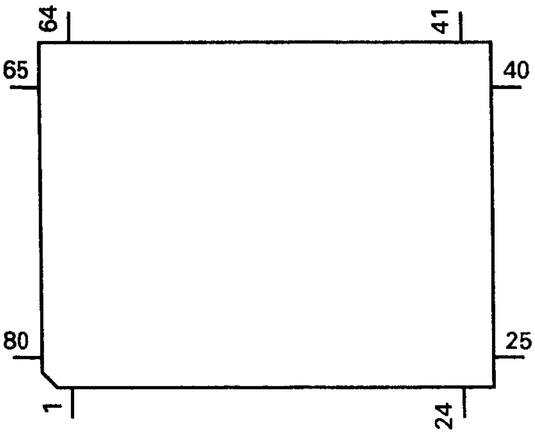

ATCK
MODE
DAC RST
DS
X VSS
XTO
XT I
X VDD
R(+)
A VDDR
R(–)
A VSS
24
23
22
21
20
19
18
17
16
15
14
13
ATTENUATION COUNTER
TIMING CONTROL
INPUT INTERFACE
R
L
FILTER OPERATION & ATTENUATION OPERATION
R
L
NOISE SHAPER OPERATION BLOCK
R
L
PWM DATA GENERATION BLOCK
R
L
1
2
3
4
5
6
7
8
9
10
11
12
MUTE
EMPH
CKO
D VSS
BCK I
D I
D VDD
LRC I
TSTN
L(+)
A VDDL
L(–)

● Pin Functions (PD5293A)

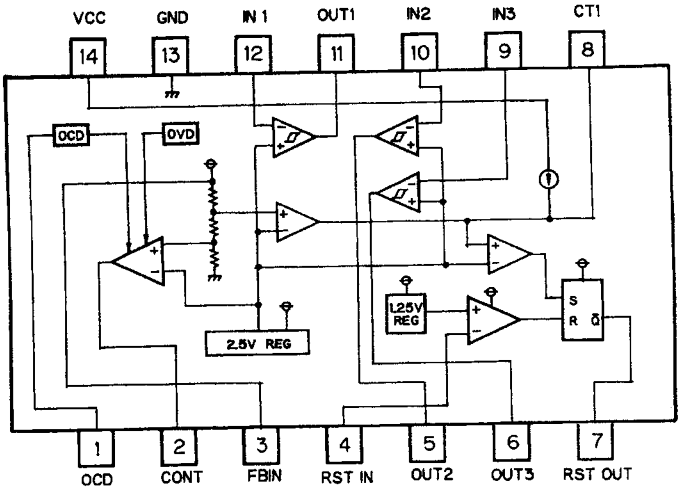
Pin No.	Pin Name	I/O	I/O Format	Function and Operation
1	$\overline{\text{TIN}}$	I	C	Tray position input
2	TEMP	I		Temperature detector
3	VDIN	I		Power supply short sensor input
4	$\overline{\text{TOUT}}$	I	C	Disc sensor timing input
5	CSI	I	C	IP-BUS data input
6	CSO	O	C	IP-BUS data output
7	APPW	O	C	IP-BUS driver power supply control output
8	AO	O	C	Control signal distingshing from LSI
9	XSCK	I/O	C	LSI clock input/output
10	XSO	O	C	LSI data output
11	XSI	I	C	LSI data input
12	$\overline{\text{STB}}$	O	C	LSI strobe output
13	$\overline{\text{RST}}$	O	C	LSI reset output
14	$\overline{\text{DCE}}$	O	C	Chip enable output
15	DACRST	O	C	D/A converter reset output
16	$\overline{\text{ASENS}}$	I		ACC power sense input
17	$\overline{\text{BSENS}}$	I		Back up power sense input
18	DMUTE	O	C	Mute output
19	$\overline{\text{DRST}}$	O	C	Reset output
20-23	NC			Not used
24	$\overline{\text{EJSW}}$	I		Eject key switch interrupt input
25	$\overline{\text{MAG}}$	I		Magazine lock switch interrupt input
26	NC			Not used
27	$\overline{\text{RESET}}$	I		Reset input
28	POWER	O	C	CD +5V control
29	CONT	O	C	Servo driver power supply control
30	XIN	I		Crystal oscillating element connection pin
31	XOUT	O		Crystal oscillating element connection pin
32	VSS			GND
33-40	D7-D0	I/O	C	External RAM data
41	$\overline{\text{WE}}$	O	C	External RAM write enable
42	$\overline{\text{PROT}}$	O	C	External RAM output enable
43	CS	O	C	External RAM chip select
44-56	A12-A0	O	C	External RAM address
57	$\overline{\text{EJP}}$	I	C	Reset position switch
58,59	NC			Not used
60	MIRR	I	C	Mirror detector input
61	LOCK	I	C	Spindle lock detector input
62	FOK	I	C	FOK signal input
63	$\overline{\text{HOME}}$	I	C	Home position detector input
64	OPTSW	I	C	Digital output ON/OFF input
65	LOAD	O	C	Mechanism power supply control
66	I3	O	C	Motor driver control output
67	I1	O	C	Motor driver control output
68	I2	O	C	Motor driver control output
69	I4	O	C	Motor driver control output
70	CDMUTE	O	C	CD mute output
71	$\overline{\text{ADENA}}$	O	C	A/D reference voltage output
72	$\overline{\text{TESTIN}}$	I	C	Test program mode input
73	VCC			Back up 5V
74	VREF	I		A/D converter reference voltage input
75	AVSS	I		A/D GND
76	UNIT	I		Unit input
77	$\overline{6}$/12	I	C	6/12 switching input
78	$\overline{\text{DISK}}$			Disc detector input
79	$\overline{\text{TSEL}}$	I		Tray position detector photo sensor
80	$\overline{\text{CSEL}}$	I	C	Compression select

I/O Format	Meaning
C	C MOS

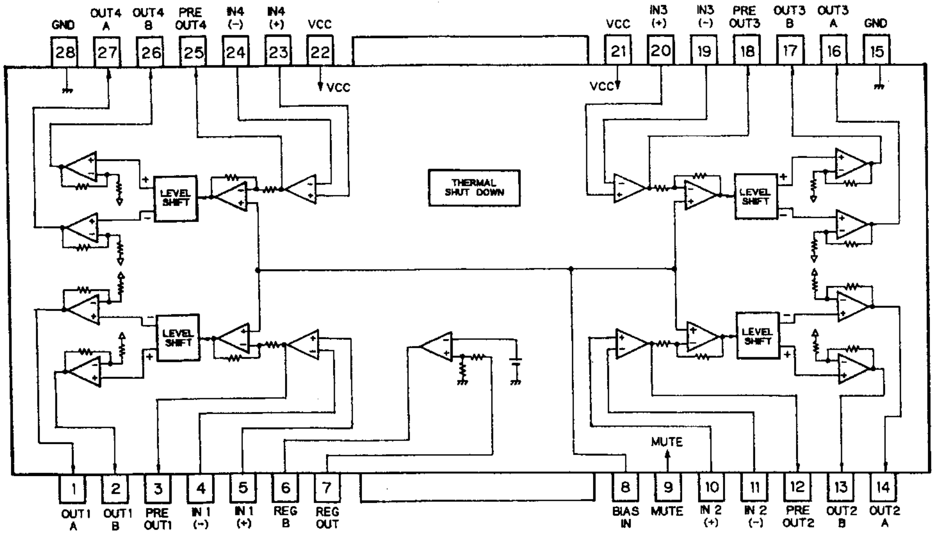
*PD5293A


64
41
65
40
80
25
1
24

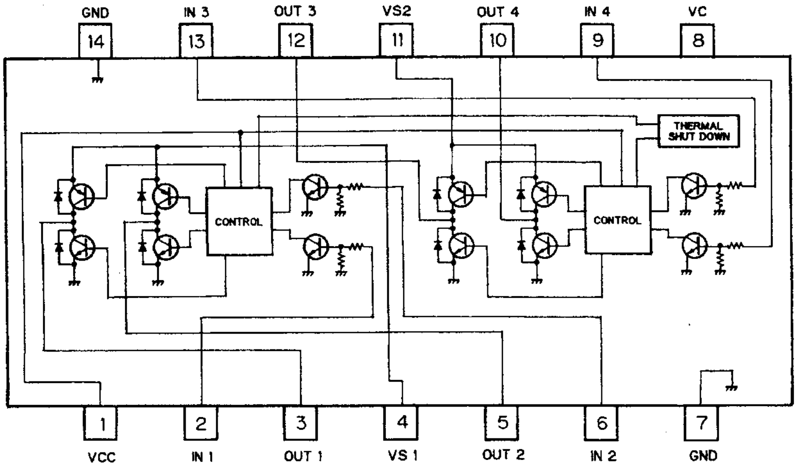
PAJ002A


VCC
GND
IN 1
OUT1
IN2
IN3
CT1
14
13
12
11
10
9
8
OCD
OVD
2.5V REG
1.25V REG
S
R
Q̄
1
2
3
4
5
6
7
OCD
CONT
FBIN
RST IN
OUT2
OUT3
RST OUT

XRA6797FP


GND
OUT4 A
OUT4 B
PRE OUT4
IN4 (-)
IN4 (+)
VCC
28
27
26
25
24
23
22
VCC
IN3 (+)
IN3 (-)
PRE OUT3
OUT3 B
OUT3 A
GND
21
20
19
18
17
16
15
VCC
VCC
LEVEL SHIFT
LEVEL SHIFT
LEVEL SHIFT
LEVEL SHIFT
THERMAL SHUT DOWN
MUTE
1
2
3
4
5
6
7
8
9
10
11
12
13
14
OUT1 A
OUT1 B
PRE OUT1
IN 1 (-)
IN 1 (+)
REG B
REG OUT
BIAS IN
MUTE
IN 2 (+)
IN 2 (-)
PRE OUT2
OUT2 B
OUT2 A

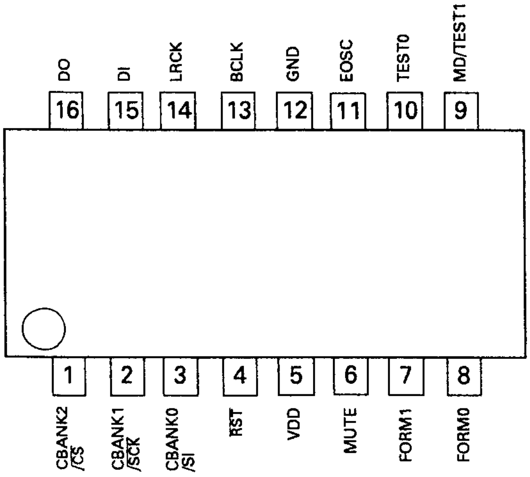
LB1836M


GND
IN 3
OUT 3
VS2
OUT 4
IN 4
VC
14
13
12
11
10
9
8
THERMAL SHUT DOWN
CONTROL
CONTROL
1
2
3
4
5
6
7
VCC
IN 1
OUT 1
VS 1
OUT 2
IN 2
GND

● Pin Functions (PD4501A)

Pin No.	Pin Name	I/O	Function and Operation
1	CBNK2/$\overline{CS}$	I	CROM bank select signal input/Chip select
2	CBNK1/$\overline{SCK}$	I	CROM bank select signal input/Clock
3	CBNK0/SI	I	CROM bank select signal input/Data
4	$\overline{RST}$	I	Reset signal input
5	VDD		Power supply
6	MUTE	I	Mute control input
7	FORM1	I	Bit clock rate select signal input
8	FORM0	I	Bit clock rate select signal input
9	MD/TEST1	I	CROM bank select /test mode select
10	TEST0	I	Test mode select
11	EOSC	I	External clock input
12	GND		GND
13	BCLK	I	Bit clock signal input
14	LRCK	I	L/R clock signal input
15	DI	I	Audio data serial input
16	DO	O	Audio data serial output

*PD4501A (CDX-P616)


DO
DI
LRCK
BCLK
GND
EOSC
TEST0
MD/TEST1
16
15
14
13
12
11
10
9
1
2
3
4
5
6
7
8
CBANK2/$\overline{CS}$
CBANK1/$\overline{SCK}$
CBANK0/SI
$\overline{RST}$
VDD
MUTE
FORM1
FORM0

6. EXPLODED VIEW PARTS LIST

NOTE:

- Parts marked by "✱"are generally unavailable because they are not in our Master Spare Parts List.
- Parts marked by "◉"are not always kept in stock. Their delivery time may be longer than usual or they may be unavailable.
- **Chassis(Exploded View:Page 2-7)**

● Parts List

Mark	No.	Description	Part No.
	1	Screw	BMZ26P080FMC
	2	Screw	BSZ30P055FZK
	3	Cord (P616/UC,P610/UC,ES)	CDE4211
		Cord (P610/EW,X1B/EW)	CDE4210
	4	Connector	CDE4372
	5	Upper Case	CNB1886
	6	Lower Case	CNB1815
	7	Insulator	CNM3987
	8	Main Unit(P616)	CWX1761
		Main Unit(P610)	CWX1721
	9	Extension Unit	CWX1729
	10	CD Mechanism Unit	CXK4000
	11	Screw	PMS26P040FMC
	12	Earth Plate	CNC5769
	13	Screw	HMF40P080FZK
	14	·····	
	15	Angle	CNB1874
	16	·····	
	17	Connector(CN1701)	CKS2764
	18	Connector(CN1801)	CKS2779
	19	Connector(CN1802)	CKS3127
	20	Heat Sink	CNC4447
	21	Connector Bracket	CNC5570
	22	Connector(CN1697)	CKS2218
	23	Connector(CN1699)	CKS2479
	24	Plug(CN1901)	CKS-460
	25	Transistor(Q1906)	2SB942
	26	Screw	BPZ26P080FMC
	27	Button	CAC3982
	28	Door(P616)	CAT1650
		Door(P610)	CAT1624
	29	Holder	CNC5362
	30	Grille Unit(P616)	CXA7758
		Grille Unit(P610)	CXA7757
	31	Connector	CDE4366

- **CD Mechanism Unit(Exploded View:Page 2-4)**
- **Parts List**

Mark	No.	Description	Part No.
	1	Screw	BMZ20P030FMC
	2	Screw	BMZ20P025FMC
	3	Screw(M2.6×3)	CBA1065
	4	LED	BR4361F
	5	·····	
	6	Screw	CBA1041
	7	Screw	CBA1077
	8	Screw	CBA1086
	9	Screw	CBA1229
	10	Screw	CBA1243
	11	Washer	CBF1038
	12	Spring	CBH1488
	13	Spring	CBH1497
	14	Spring	CBH1498
	15	·····	
	16	Spring	CBH1588
	17	Spring	CBH1589
	18	Spring	CBH1744
	19	Spring	CBH1592
	20	Spring	CBH1593
	21	Spring	CBH1594
	22	Spring(Silver)	CBH1596
	23	Spring	CBH1597
	24	Spring	CBH1599
	25	Spring	CBH1604
	26	Spring	CBH1605
	27	Spring(Silver)	CBH1606
	28	Spring(Brown)	CBH1607
	29	Spring	CBH1631
	30	Spring(Black)	CBH1633
	31	Spring	CBH1667
	32	Spring	CBH1706
	33	Spring	CBH1721
	34	Spring	CBL1157
	35	Arm	CBL1186
	36	Arm	CBL1187
	37	Spring	CBL1210
	38	Connector	CDE4244
	39	·····	
	40	PU Unit	CGY1036
	41-44	·····	
	45	Shaft	CLA2027
	46	Shaft	CLA2322
	47	Shaft	CLA2345
	48	Link	CNC5150
	49	Lever	CNC5166
	50	Arm	CNC5168
	51	Arm	CNC5169
	52	Bracket	CNC5170
	53	CM Bracket	CNC5171
	54	Cover	CNC5172
	55	Upper Frame	CNC5175
	56	Main Frame	CNC5176
	57	Side Frame	CNC5178
	58	Bracket	CNC5462
	59	Cover	CNC5567
	60	Cover	CNC5576
	61	Lever	CNC5678
	62	Plate	CNC5782
	63	Spacer	CNM1787
	64	Sheet	CNM3897
	65	Sheet	CNM4337
	66	Insulator	CNM4266
	67	P.C.Board	CNP3642
	68	P.C.Board	CNP3730
	69	Belt	CNT1047
	70	Rack	CNV3355
	71	Holder	CNV3363
	72	Gear	CNV3753
	73	Gear	CNV3754
	74	Guide	CNV3756
	75	Arm	CNV3757
	76	Arm	CNV3758
	77	Arm	CNV4185
	78	Worm Wheel	CNV3761
	79	Gear	CNR1382
	80	Gear	CNV3763
	81	Gear	CNV3764
	82	Gear	CNV3765
	83	Gear	CNV3766
	84	Gear	CNV3767
	85	Arm	CNV3769
	86	Guide	CNV3770
	87	Guide	CNV3771
	88	Guide	CNV3772
	89	Guide	CNV3773
	90	Arm	CNV3775
	91	Bearing	CNV3778
	92	Holder	CNV3779
	93	Damper	CNV3780

Mark	No.	Description	Part No.
	94	Cam	CNV3781
	95	Guide	CNV3784
	96	Guide	CNV3785
	97	Arm	CNV3787
	98	Plate	CNV3912
	99	Arm	CNV3914
	100	Composite P.C.Board	CNX2236
	101	·····	
	102	Composite P.C.Board	CNX2237
	103	·····	
	104,105	·····	
	106	Switch(S802-805)	CSN1012
	107	Switch(S801)	CSN1029
	108	P.C.Board Unit	CWX1809
	109	Connector(6P)	CKS1944
	110	Connector(17P)	CKS1955
	111	Connector(30P)	CKS1968
	112	Connector(7P)	CKS2406
	113	Motor Unit(M804)	CXA4649
	114	Damper Unit	CXA6443
	115	Stage Chassis Unit	CXA6608
	116	CRG Chassis Unit	CXA6609
	117	Steer Unit	CXA6610
	118	Bracket Unit	CXA6611
	119	Magazine Holder Unit	CXA6612
	120	Lever Unit	CXA6613
	121	Lower Cover Unit	CXA6614
	122	Bracket Unit	CXA6615
	123	Cam Ring Unit	CXA6616
	124	Lever Unit	CXA6619
	125	Lever Unit	CXA6620
	126	Link Unit	CXA6621
	127	Arm Unit	CXA6622
	128	Arm Unit	CXA6623
	129	Arm Unit	CXA6624
	130	Frame Unit	CXA6625
	131	Lever Unit	CXA6626
	132	Motor Unit(M803)	CXA6977
	133	Motor Unit(M802)	CXA6978
	134	Screw Unit	CXA6990
	135	Motor Unit(M801)	CXA6991
	136	Arm Unit	CXA7153
	137	·····	
	138	Clamper Unit	CXA7632
	139,140	·····	
	141	Screw	JFZ17P025FNI
	142	Screw	JFZ20P025FNI
	143	Photo-transistor (P801,802)	PT4800
	144	Spring	CBH1741

Mark	No.	Description	Part No.
	145	Screw	JFZ20P014FMC
	146	Washer	CBF1002

7. ELECTRICAL PARTS LIST

NOTE:

- Parts whose parts numbers are omitted are subject to being not supplied.
- The part numbers shown below indicate chip components.

  Chip Resistor

  RS1/○S○○○J,RS1/○○S○○○J

  Chip Capacitor (except for CQS.....)

  CKS....., CCS....., CSZS.....

=====Circuit Symbol & No.	Part Name=====	Part No.
Unit Number :		
Unit Name :	Extension P.C.Board	
MISCELLANEOUS		
Q 1693 1697		DTA144ES
Q 1696		DTC114YS
Q 1698 1699		DTC343TS
Q 1799		2SC2458
Q 1906		2SB942
Q 1907 1908		2SD1859
D 1698 1699		1SS133
D 1798 1799		RD18JSB1
D 1901 1903		ERA15-02VH
L 1901	Choke Coil	CTH1129
SW1799	Switch(Adress)	CSH1038
RESISTORS		
R 1695 1910		RD1/4PS103JL
R 1696 1697		RD1/4PS332JL
R 1698 1699		RD1/4PS112JL
R 1791		RD1/4PS102JL
R 1792 1793 1794		RD1/4PS513JL
R 1795 1796 1908		RD1/4PS101JL
R 1798		RD1/4PS273JL
R 1799		RD1/4PS433JL
R 1906		RD1/4PS104JL
R 1907		RD1/4PS204JL
R 1909 1911		RD1/4PS201JL
R 1912		RD1/4PS241JL
R 1913		RD1/4PS681JL
R 1914		RD1/4PS511JL
R 1915		RD1/4PS104JL
CAPACITORS		
C 1698 1699		CEA330M10LL
C 1798 1799		CKPYB471K50L
C 1901 1905	470μF/16V	CCH1183
C 1904		CEA220M10LL
C 1906	470μF/16V	CCH1183
C 1907		CKPYB102K50L
Unit Number :	CWX1761(CDX-P616/UC)	
Unit Name :	Main Unit	
MISCELLANEOUS		
IC 1001		UPC2571GS
IC 1201		UPD63700GF
IC 1301		PD4501A
IC 1401		XRA6797FP
IC 1601		SM5874AM
IC 1602		XRA4560F
IC 1603		NJM78L05A
IC 1701		PD5293A
IC 1702		LH5160HN-10L
IC 1703		PA0051AM
IC 1704		PAJ002A
IC 1801		LB1836M
Q 1001		2SA1015
Q 1401 1709		2SB1238
Q 1701		DTA144ES
Q 1703		DTC144ES
Q 1704 1707 1801		DTA123JS
Q 1708 1802		DTC114YS
D 1401 1402 1403		ERA15-02VH
D 1701 1702		1SS292
X 1601	Resonator 16.9340MHz	CSS1328
X 1701	Ceramic Resonator	CSS1310
S 1701 1702	Switch(EJECT,RESET)	CSG1059
VR1001	Semi-fixed 2.2kΩ(B)	CCP1177
VR1002	Semi-fixed 22kΩ(B)	CCP1183
VR10031004	Semi-fixed 47kΩ(B)	CCP1185
RESISTORS		
R 1001		RD1/4PS220JL
R 1002		RD1/4PS0R0JL
R 1003		RD1/4PS103JL
R 1004 1768		RS1/16S102J
R 1005		RS1/16S823J
R 1006		RS1/16S182J
R 1007		RS1/16S333J
R 1011 1012		RS1/16S683J
R 1013 1024 1025		RD1/4PS102JL
R 1014 1410		RS1/16S473J
R 1018		RD1/4PS622JL
R 1019 1401 1407 1716		RS1/16S563J
R 1020		RS1/16S622J
R 1021 1701		RS1/16S513J
R 1022 1408		RS1/16S133J
R 1027		RS1/16S183J
R 1028		RS1/16S822J
R 1201 1406 1411 1605 1606 1607 1608 1702 1712 1741		RS1/16S103J
R 1402 1403 1613 1614 1615 1616		RS1/16S163J
R 1404		RS1/16S753J
R 1405 1708		RS1/16S433J
R 1409		RS1/16S153J
R 1412		RS1/16S152J
R 1602		RS1/16S471J
R 1609 1610 1611 1612		RS1/16S752J
R 1617 1618 1769		RS1/16S101J
R 1619		RS1/16S102J
R 1704		RS1/16S154J
R 1705 1713 1715 1718 1721 1730 1731 1732 1733 1734		RS1/16S104J
R 1707		RS1/16S0R0J
R 1709 1710 1714 1722 1729 1735 1744 1745		RS1/16S222J
R 1717		RS1/16S123J
R 1719 1742 1766		RS1/16S0R0J
R 1737 1738 1739		RS1/16S104J
R 1747 1748		RS1/16S104J

=====Circuit Symbol & No.	Part Name=====	Part No.
R 1756		RS1/16S104J
R 1767		RD1/4PS3R9JL
R 1771		RS1/16S102J
R 1801 1802		RD1/4PS391JL

CAPACITORS

=====Circuit Symbol & No.	Part Name=====	Part No.
C 1001 1008 1010 1011 1708 1709		CKSRYB102K50
C 1002		CEA101M6R3LL
C 1003 1021 1602 1603 1604 1605		CKSQYB104K16
C 1004		CEA470M6R3LL
C 1005		CCSRCH101J50
C 1006 1023		CKSRYB561K50
C 1007		CKSYB334K16
C 1009		CCSRCH181J50
C 1013 1301 1701 1702 1705 1707		CKSRYB103K25
C 1014		CCSRCH220J50
C 1015 1201 1202		CKSYF105Z16
C 1018		CEA220M6R3LL
C 1022		CKSRYB332K50
C 1026		CKSRYB103K25
C 1203		CKSRYB471K50
C 1302		CEA470M6R3LL
C 1401		CSZA220M10
C 1402		CKSQYB103K50
C 1403		CKSQYB153K50
C 1404 1405		CEAS221M10
C 1406 1407		CKSRYB152K50
C 1408		CKSRYB271K50
C 1606 1607		CCSRCH470J50
C 1608		CEA101M6R3LL
C 1609 1610		CCSRCH221J50
C 1611 1612 1613 1614		CCSRCH680J50
C 1616		CKSYB224K16
C 1617 1618		CKSRYB103K25
C 1703		CASA330M10
C 1704		CEA221M6R3LL
C 1706		CKSRYB103K50
C 1710		CKSRYB103K25
C 1802		CEA220M16LL

Unit Number : CWX1721(CDX-P610/UC,EW,X1B/EW,ES)
Unit Name : Main Unit

MISCELLANEOUS

=====Circuit Symbol & No.	Part Name=====	Part No.
IC 1001		UPC2571GS
IC 1201		UPD63700GF
IC 1401		XRA6797FP
IC 1601		SM5874AM
IC 1602		XRA4560F
IC 1603		NJM78L05A
IC 1701		PD5293A
IC 1702		LH5160HN-10L
IC 1703		PA0051AM
IC 1704		PAJ002A
IC 1801		LB1836M
Q 1001		2SA1015
Q 1401 1709		2SB1238
Q 1701		DTA144ES
Q 1703		DTC144ES
Q 1704 1707 1801		DTA123JS
Q 1708 1802		DTC114YS
D 1401 1402 1403		ERA15-02VH
D 1701 1702		1SS292
X 1601	Resonator 16.9340MHz	CSS1328
X 1701	Ceramic Resonator	CSS1310
S 1701 1702	Switch(EJECT,RESET)	CSG1059
VR1001	Semi-fixed 2.2kΩ(B)	CCP1177
VR1002	Semi-fixed 22kΩ(B)	CCP1183
VR1003 1004	Semi-fixed 47kΩ(B)	CCP1185

RESISTORS

=====Circuit Symbol & No.	Part Name=====	Part No.
R 1001		RD1/4PS220JL
R 1002		RD1/4PS0R0JL
R 1003		RD1/4PS103JL
R 1004 1768		RS1/16S102J
R 1005		RS1/16S823J
R 1006		RS1/16S182J
R 1007		RS1/16S333J
R 1011 1012		RS1/16S683J
R 1013 1024 1025		RD1/4PS102JL
R 1014 1410		RS1/16S473J
R 1018		RD1/4PS622JL
R 1019 1401 1407 1716		RS1/16S563J
R 1020		RS1/16S622J
R 1021 1701		RS1/16S513J
R 1022 1408		RS1/16S133J
R 1027		RS1/16S183J
R 1028		RS1/16S822J
R 1201 1406 1411 1605 1606 1607 1608 1702 1712 1741		RS1/16S103J
R 1402 1403 1613 1614 1615 1616		RS1/16S163J
R 1404		RS1/16S753J
R 1405 1708		RS1/16S433J
R 1409		RS1/16S153J
R 1412		RS1/16S152J
R 1601		RS1/16S0R0J
R 1602		RS1/16S471J
R 1609 1610 1611 1612		RS1/16S752J
R 1617 1618 1769		RS1/16S101J
R 1619		RS1/16S102J
R 1704		RS1/16S154J
R 1705 1713 1715 1718 1721 1730 1731 1732 1733 1734		RS1/16S104J
R 1706		RS1/16S104J
R 1709 1710 1714 1722 1729 1735 1744 1745		RS1/16S222J
R 1717		RS1/16S123J
R 1719 1742 1766		RS1/16S0R0J
R 1737 1738 1739		RS1/16S104J
R 1747 1748		RS1/16S104J
R 1756		RS1/16S104J
R 1767		RD1/4PS3R9JL
R 1771		RS1/16S102J
R 1801 1802		RD1/4PS391JL

CAPACITORS

=====Circuit Symbol & No.	Part Name=====	Part No.
C 1001 1008 1010 1011 1708 1709		CKSRYB102K50
C 1002		CEA101M6R3LL
C 1003 1021 1602 1603 1604 1605		CKSQYB104K16
C 1004		CEA470M6R3LL
C 1005		CCSRCH101J50
C 1006 1023		CKSRYB561K50
C 1007		CKSYB334K16
C 1009		CCSRCH181J50
C 1013 1701 1702 1705 1707		CKSRYB103K25
C 1014		CCSRCH220J50
C 1015 1201 1202		CKSYF105Z16
C 1018		CEA220M6R3LL
C 1022		CKSRYB332K50
C 1026		CKSRYB103K25
C 1203		CKSRYB471K50
C 1401		CSZA220M10
C 1402		CKSQYB103K50
C 1403		CKSQYB153K50
C 1404 1405		CEAS221M10
C 1406 1407		CKSRYB152K50
C 1408		CKSRYB271K50
C 1606 1607		CCSRCH470J50
C 1608		CEA101M6R3LL
C 1609 1610		CCSRCH221J50
C 1611 1612 1613 1614		CCSRCH680J50

=====Circuit Symbol & No.	Part Name=====	Part No.
C 1616		CKSYB224K16
C 1617 1618		CKSRYB103K25
C 1703		CASA330M10
C 1704		CEA221M6R3LL
C 1706		CKSRYB103K50
C 1710		CKSRYB103K25
C 1802		CEA220M16LL

Unit Number :
Unit Name : P.C.Board

C 801 802		CKSQYB561K50

Unit Number :
Unit Name : Mechanism P.C.Board

D 802	LED	BR4361F
S 805	Switch(Home)	CSN1012

Unit Number :
Unit Name : Photo P.C.Board

D 801	LED	BR4361F
S 801	Switch(RSTP)	CSN1025
S 802	Switch(MAG)	CSN1012

Miscellaneous Parts List

	PU Unit	CGY1036
M 802	Motor Unit(ELV)	CXA6978
M 803	Motor Unit(Tray)	CXA6977
M 801	Motor Unit(Spindle)	CXA6991
M 804	Motor Unit(Carriage)	CXA4649
P 801 802	Photo-Transistor	PT4800
S 803 804	Switch(TRP,DSP)	CSN1012

PIONEER
The Art of Entertainment

Service Manual

ORDER NO.
CRZ1632

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MULTI-COMPACT DISC PLAYER

CDX-P616 UC
CDX-P610 UC,EW,ES
CDX-P610 X1B/EW

COMPACT
disc
DIGITAL AUDIO

- **See the separate manual CX-624 (CRT1631) for the CD mechanism description and disassembly.**
- **The CD mechanism employed in this model is one of CX-624 series.**

CHAPTER 2

CONTENTS

CHAPTER 2

1. EXPLODED VIEW 2-3
2. PACKING METHOD 2-8
3. CONNECTION DIAGRAM(1) 2-13
4. SCHEMATIC CIRCUIT DIAGRAM(1) 2-17
5. SCHEMATIC CIRCUIT DIAGRAM(2) 2-20
6. CONNECTION DIAGRAM(2) 2-23
7. BLOCK DIAGRAM 2-25

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K-FFS.OCT. 1994 Printed in Japan

1. EXPLODED VIEW

● Magazine Assy(CXA5483)

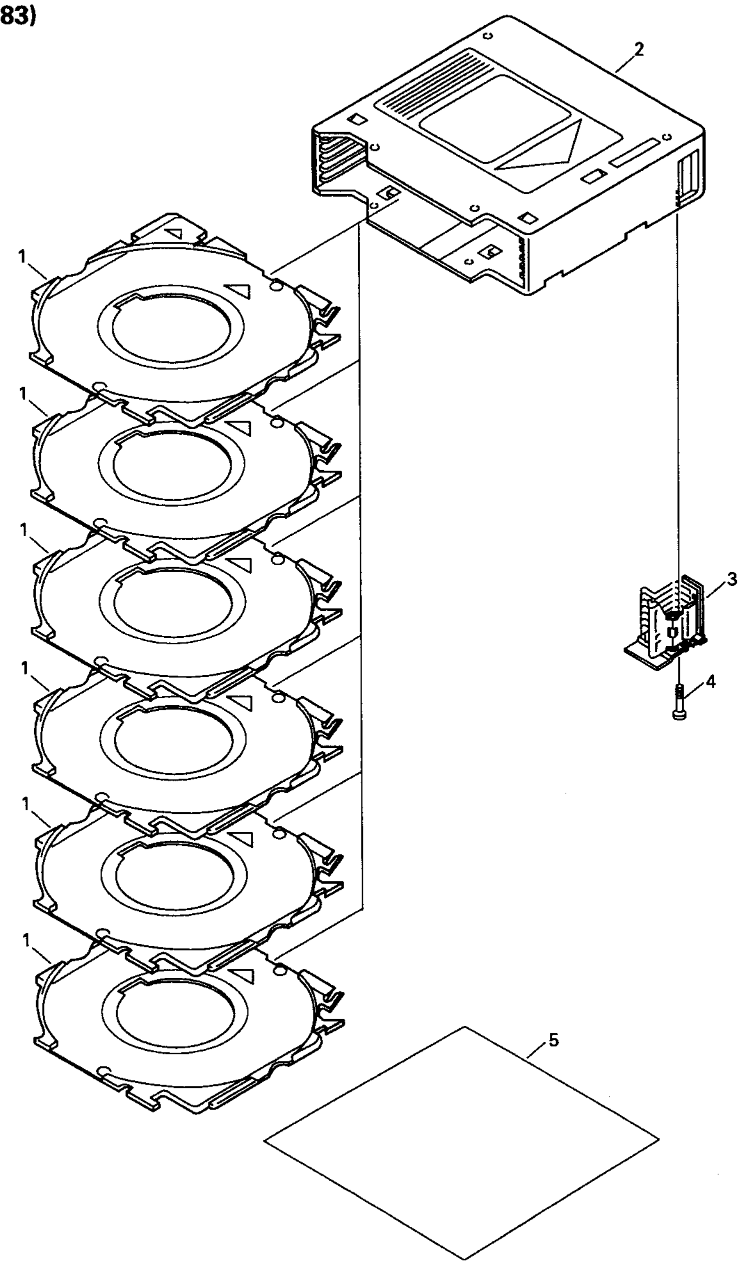
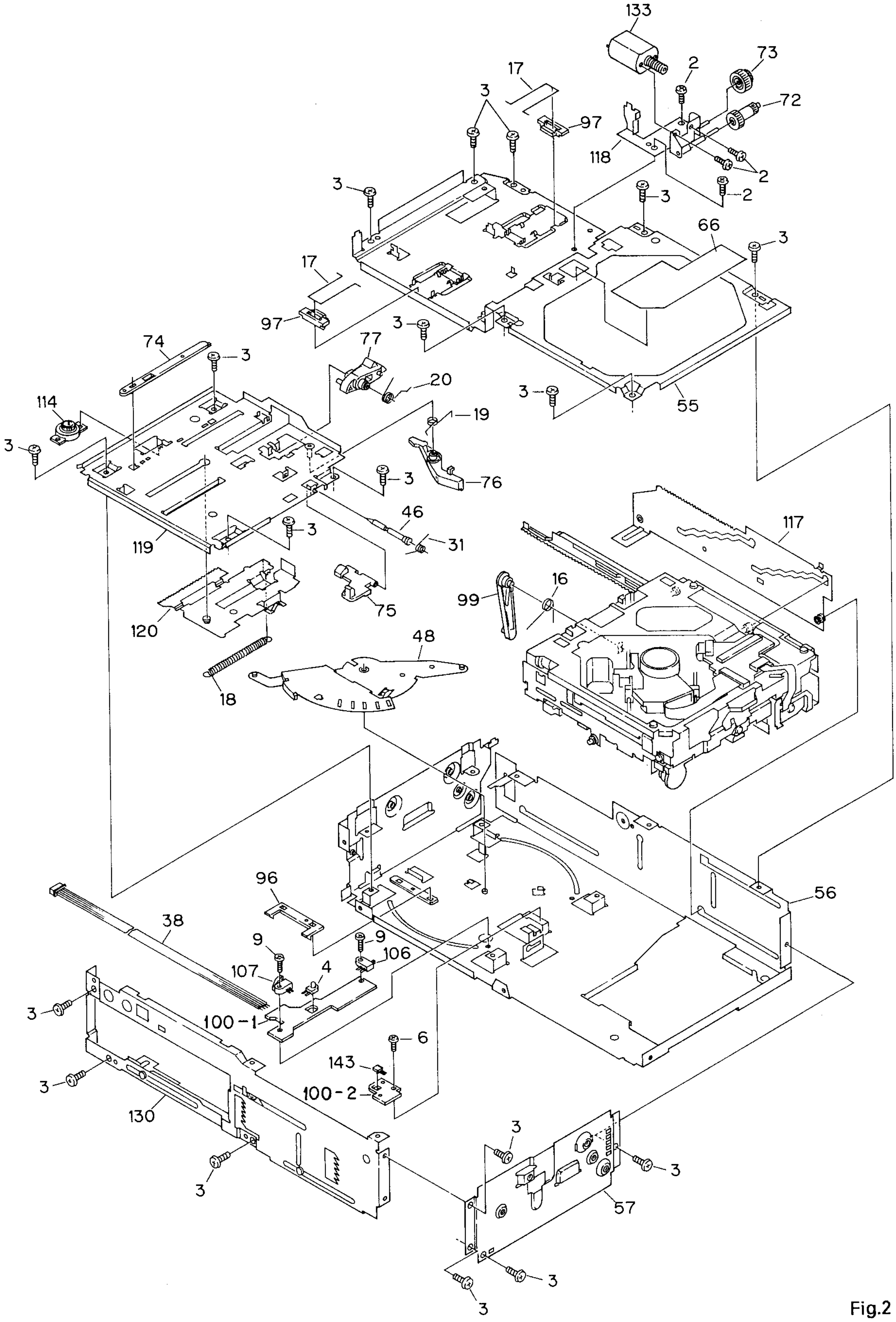


Fig.1

● Parts List

Mark	No.	Description	Part No.
	1	Tray Unit	CXA5484
	2	Case Unit	CXA5479
	3	Bracket Assy	CXA5480
	4	Screw(M2×13)	CBA1272
	5-1	Owner's Manual	CRD1639
	5-2	Label	CRW1248

● CD Mechanism Unit(Parts List:Page 1-40)


133
73
2
72
17
3
97
118
2
2
3
66
3
3
17
97
3
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3
77
20
3
55
114
3
19
76
3
46
117
3
31
119
16
99
75
120
48
18
96
56
38
9
9
107
4
106
3
100-1
6
143
3
100-2
130
3
3
3
57
3
3

Fig.2

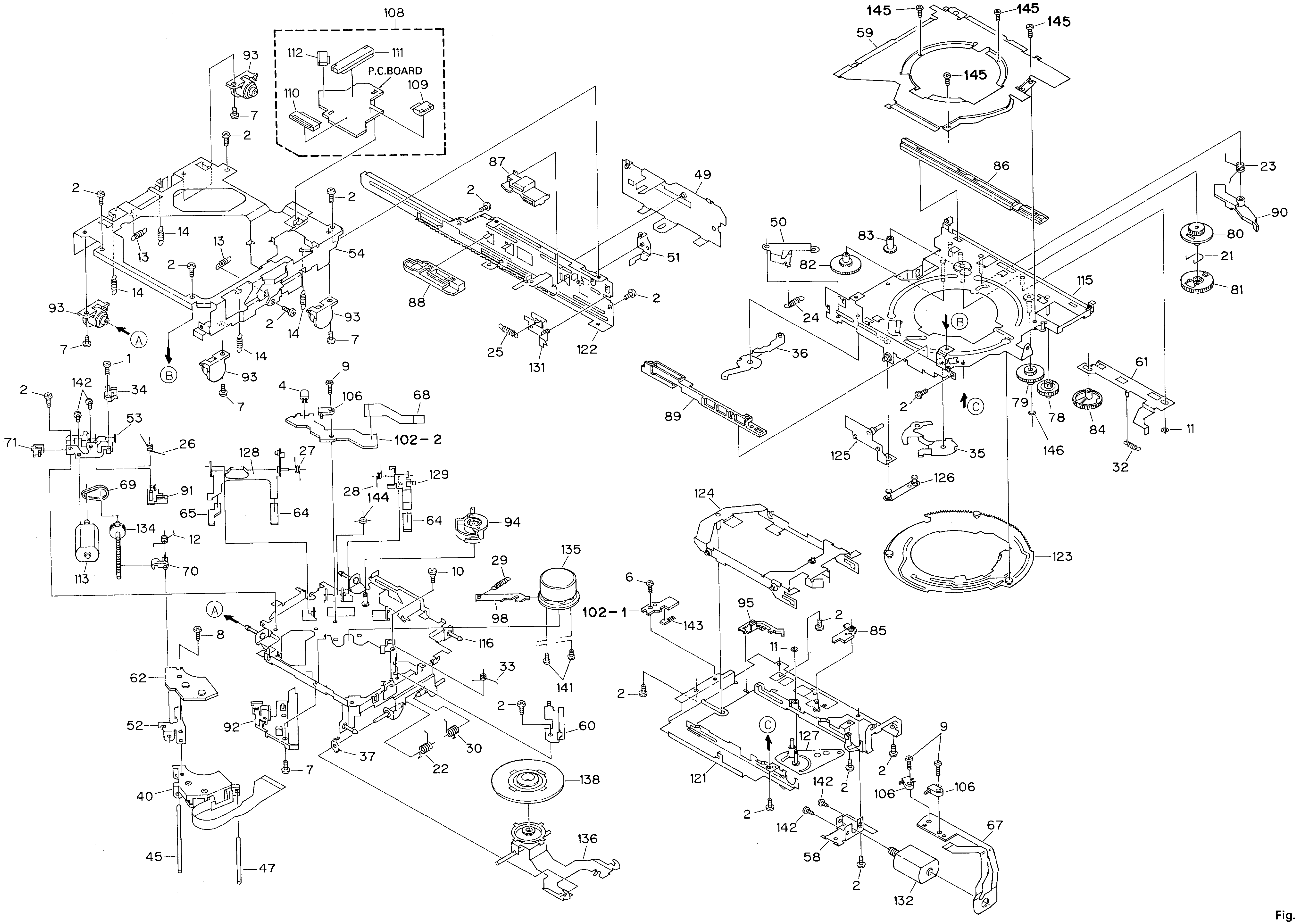
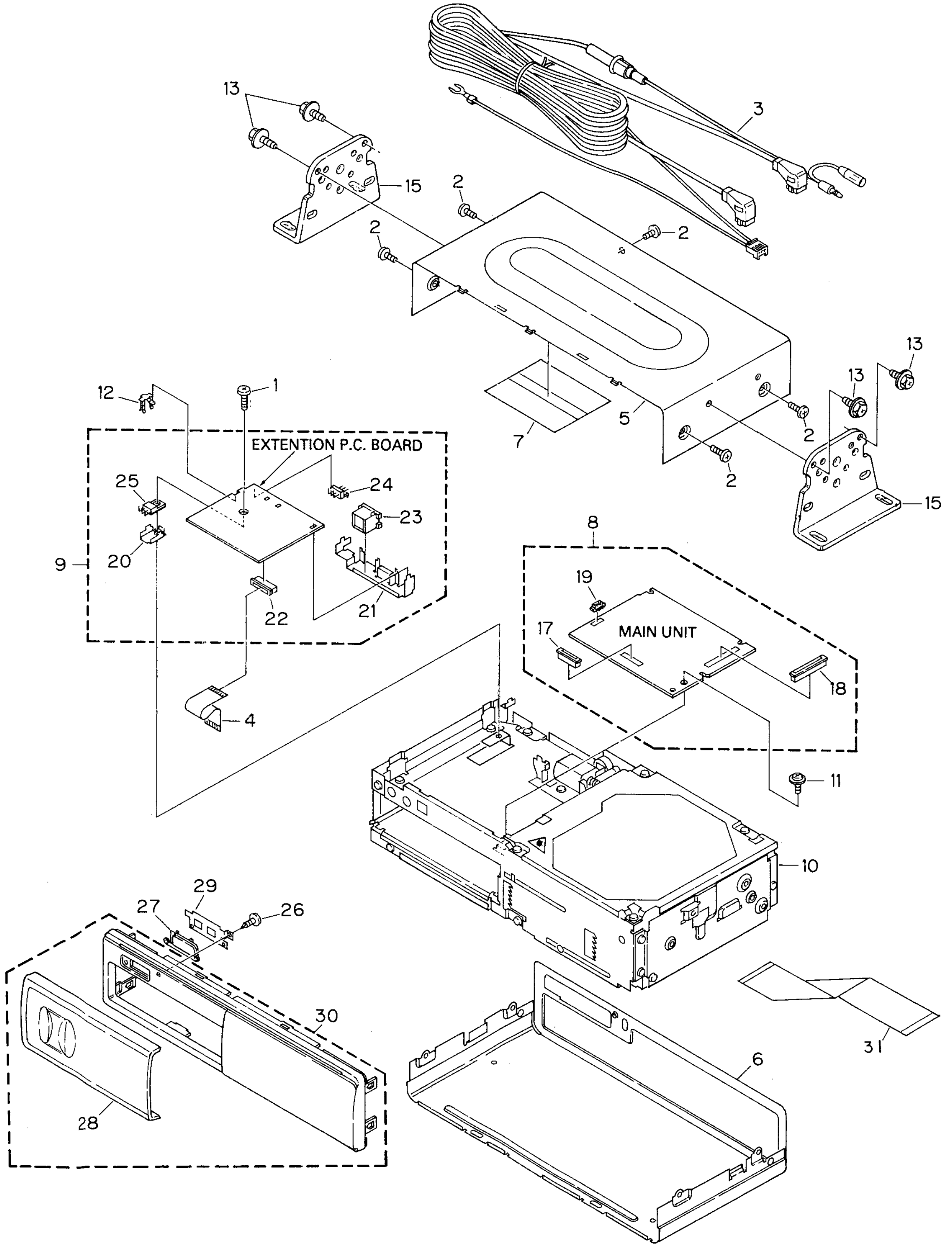

P.C.BOARD
A
B
B
C
102-2
A
102-1
C

Fig.3

● **Chassis(Parts List:Page 1-39)**


13
3
15
2
2
2
13
13
12
1
EXTENTION P.C. BOARD
25
24
23
9
20
22
21
7
5
5
2
2
15
8
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17
MAIN UNIT
18
4
11
10
29
27
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30
31
6
28

Fig.4

2. PACKING METHOD

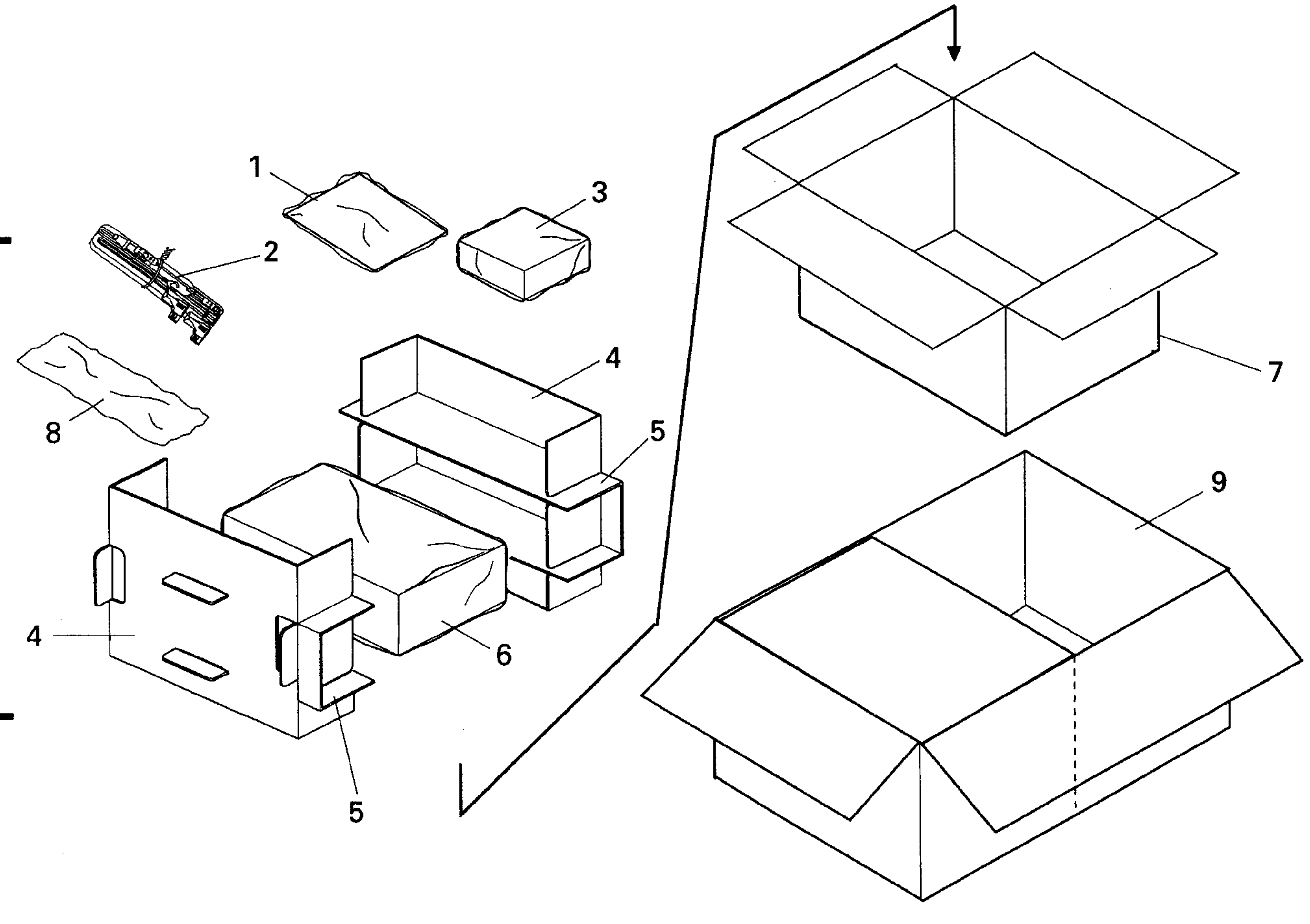

1
3
2
4
8
5
4
6
5
7
9

Fig.5

Parts List(CDX-P616/UC)

*:Non spare part

Mark	No.	Description	Part No.
	1-1	Polyethylene Bag	CEG1116
	1-2	Owner's Manual	CRD1780
*	1-3	Warranty Card	CRY1070
	2	Cord	CDE4211
	3	Magazine Assy	CXA5483
	4	Protector	CHP1662
	5	Protector	CHP1661
	6	Polyethylene Bag	CEG1174
	7	Carton	CHG2510
	8	Accessory Assy	CEA2019

Mark	No.	Description	Part No.
	8-1	Screw Assy	CEA1962
	8-1-1	Screw(×4)	CBA1295
*	8-1-2	Polyethylene Bag	E36-615
	8-1-3	Screw(×4)	HMB60P500FMC
	8-1-4	Screw(×4)	HMF40P080FZK
	8-1-5	Nut(×4)	NF60FMC
	8-2	Angle(×2)	CNB1874
*	8-3	Polyethylene Bag	E36-634
	9	Contain Box	CHL2510

- The CDX-P610/UC,EW,ES and CDX-P610/X1B/EW Parts Lists enumerate the parts which differ from those enumerated in the CDX-P616/UC Parts List only. The parts other than those enumerated in the former are identical with those in the latter, to which you are requested to refer, accordingly. The CDX-P616/UC Parts List is given on page 2-9.

			CDX-P616/UC	CDX-P610/UC	CDX-P610/EW	CDX-P610/ES	CDX-P610/X1B/EW
Mark	No.	Description	Part No.	Part No.	Part No.	Part No.	Part No.
	1-1	Polyethylene Bag	CEG1116	CEG1116	CEG1116	•••••	*UEG-004
	1-2	Owner's Manual	CRD1780	CRD1778	CRD1777 CRD1776	CRD1779	CRD1777 CRD1776
*	1-3	Warranty Card	CRY1070	•••••	CRY1071	•••••	URY-001
	2	Cord	CDE4211	CDE4211	CDE4210	CDE4211	CDE4210
	6	Polyethylene Bag	CEG1185	CEG1185	CEG1042	CEG1042	UEG-003
	7	Carton	CHG2510	CHG2508	CHG2507	CHG2509	CHG2507
	9	Contain Box	CHL2510	CHL2508	CHL2507	CHL2509	CHL2507
*		Card	•••••	ARY1048	•••••	•••••	•••••

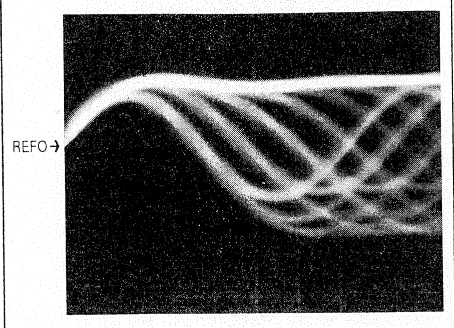
Owner's Manual

Part No.	Model	Language
CRD1776	CDX-P610/EW	English,Italian,French,German,Dutch
CRD1777	CDX-P610/EW	Spanish,Portuguese,Swedish,Norwegian,Finnish
CRD1778	CDX-P610/UC	English,French
CRD1779	CDX-P610/ES	English,French,German,Spanish,Arabic
CRD1780	CDX-P616/UC	English,French

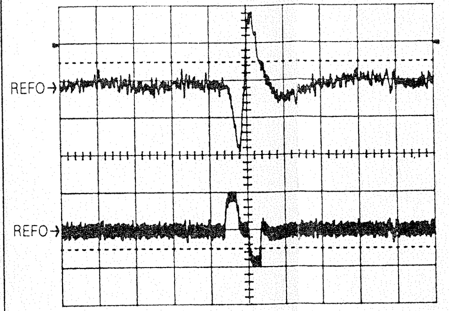
Note: 1. The encircled numbers denote measuring pointes in the circuit diagram.
2. Reference voltage
REFO: 2.5V

Waveforms

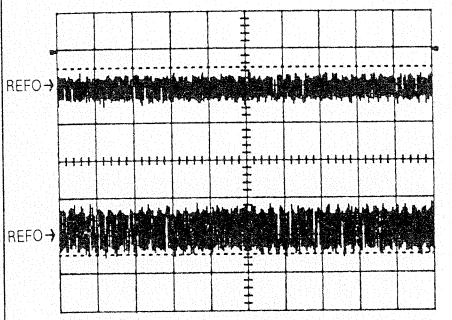
① RFO 0.5V/div. 0.2µs/div.
Normal mode: play



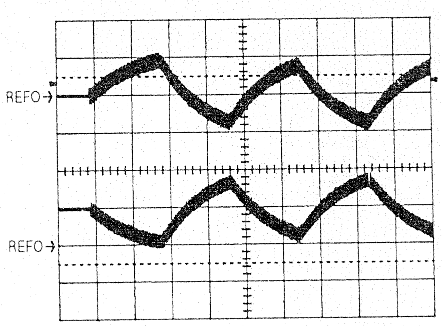
④ CH1: TEY 0.5V/div. 0.5ms/div.
⑤ CH2: TIN 1V/div.
Test mode: Single jump (FWD)



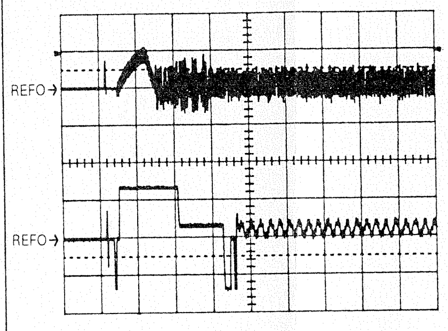
④ CH1: TEY 0.5V/div. 20ms/div.
⑤ CH2: TIN 0.5V/div.
Normal mode: Play



② CH1: FIN 1V/div. 0.2s/div.
③ CH2: FO+ 2V/div.
Test mode: No disc, Focus close

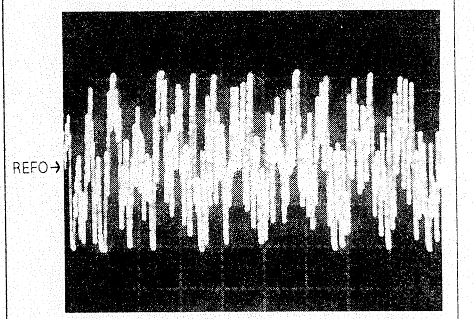


② CH1: FIN 1V/div. 0.5s/div.
⑦ CH2: SIN 1V/div.
Normal mode: Focus close (12cm)

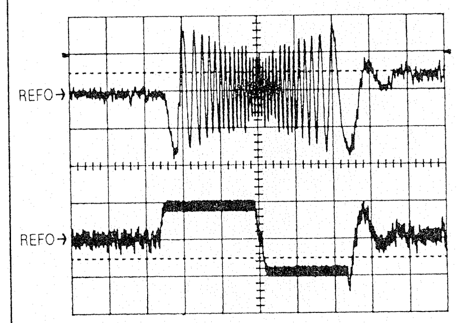


⑦ SIN 0.5V/div. 10ms/div.

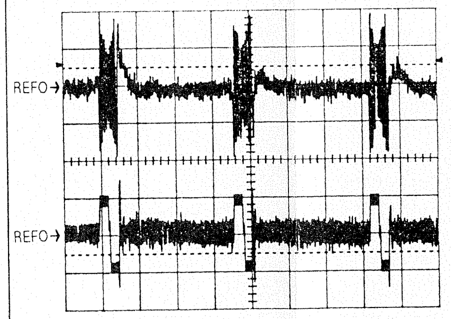
Search (12cm disc)



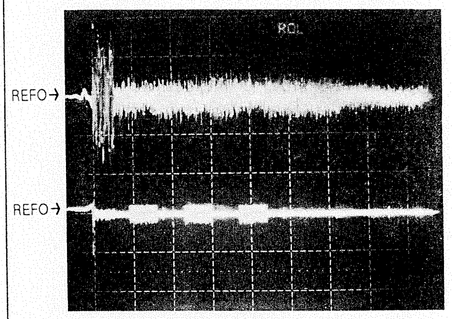
④ CH1: TEY 0.5V/div. 0.5ms/div.
⑤ CH2: TIN 1V/div.
Test mode: 32 track jump (FWD)



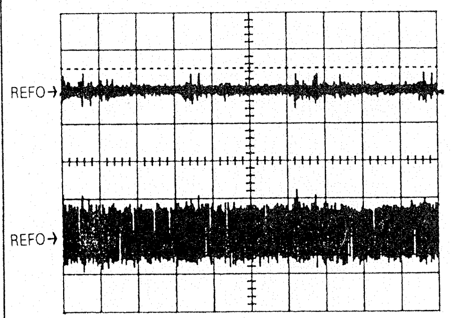
④ CH1: TEY 0.5V/div. 5ms/div.
⑤ CH2: TIN 1V/div.
Test mode: 100 track jump (FWD)



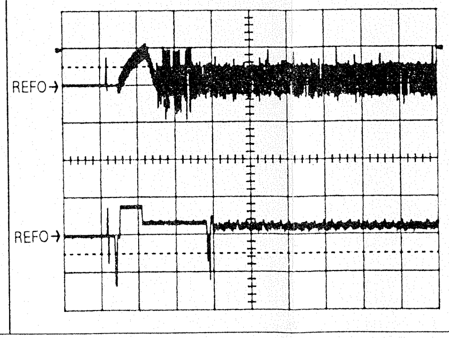
④ CH1: TEY 0.5V/div. 0.1s/div.
⑥ CH2: FEY 0.5V/div.
Normal mode: AGC after focus close



⑥ CH1: FEY 0.2V/div. 20ms/div.
② CH2: FIN 0.5V/div.
Normal mode: Play

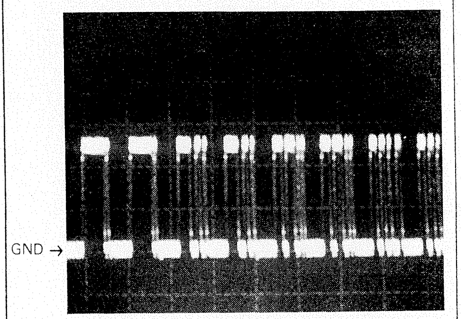


② CH1: FIN 1V/div. 0.5s/div.
⑦ CH2: SIN 1V/div.
Normal mode: Focus close (8cm)

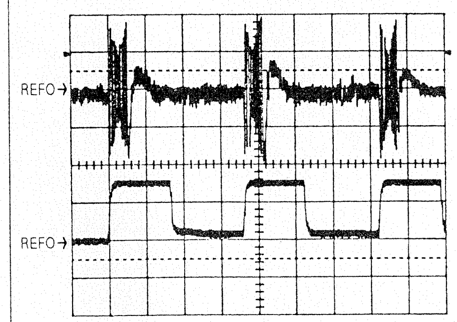


⑫ DATA 2V/div. 10µs/div.

Play

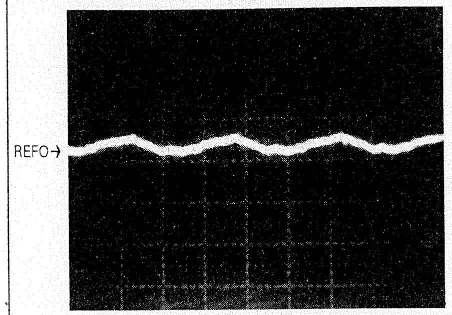


④ CH1: TEY 0.5V/div.
⑧ CH2: CIN 0.5V/div. 5ms/div.
Test mode: 100 track jump (FWO)

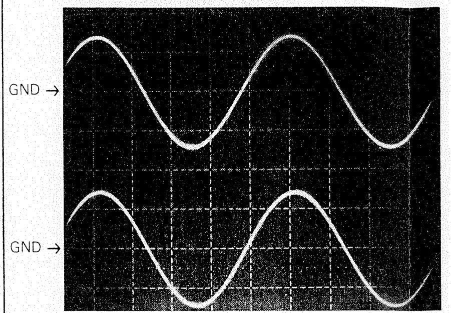


⑦ SIN 0.5V/div. 50ms/div.

Normal mode: 1Play (12cm disc)

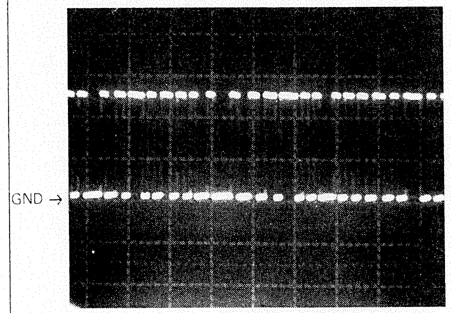


⑭ CH1: R OUT 1V/div.
⑮ CH2: L OUT 1V/div. 0.2ms/div.
Normal mode: Play (1kHz 0dB)

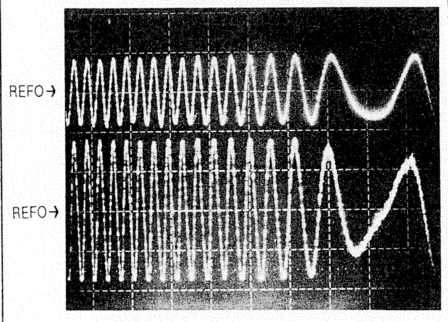


⑨ EFM 2V/div. 5µs/div.

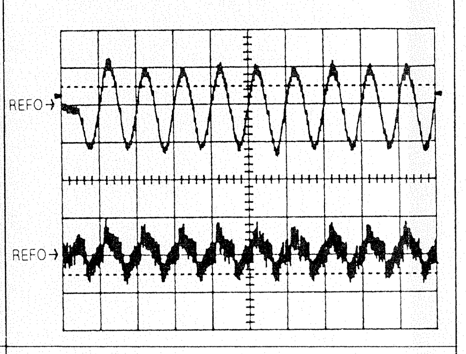
Play



④ CH1: TEY 1V/div.
⑩ CH2: TEC 1V/div. 2ms/div.
Test mode: Focus closed
Tracking open

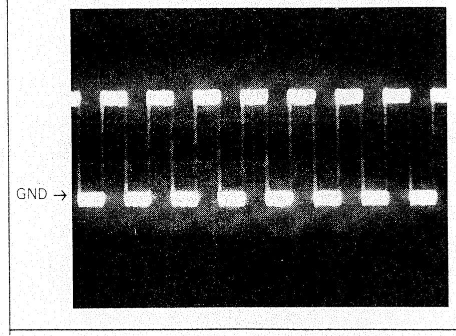


⑥ CH1: FEY 0.2V/div.
② CH2: FIN 1V/div. 1ms/div.
Normal mode: During AGC



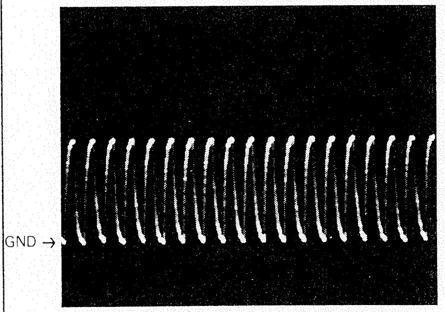
⑬ LRCK 2V/div. 20µs/div.

Play

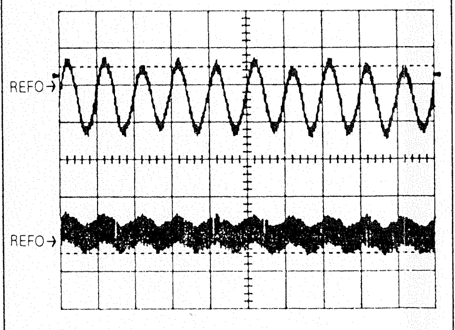


⑪ SCKO 2V/div. 1µs/div.

Play

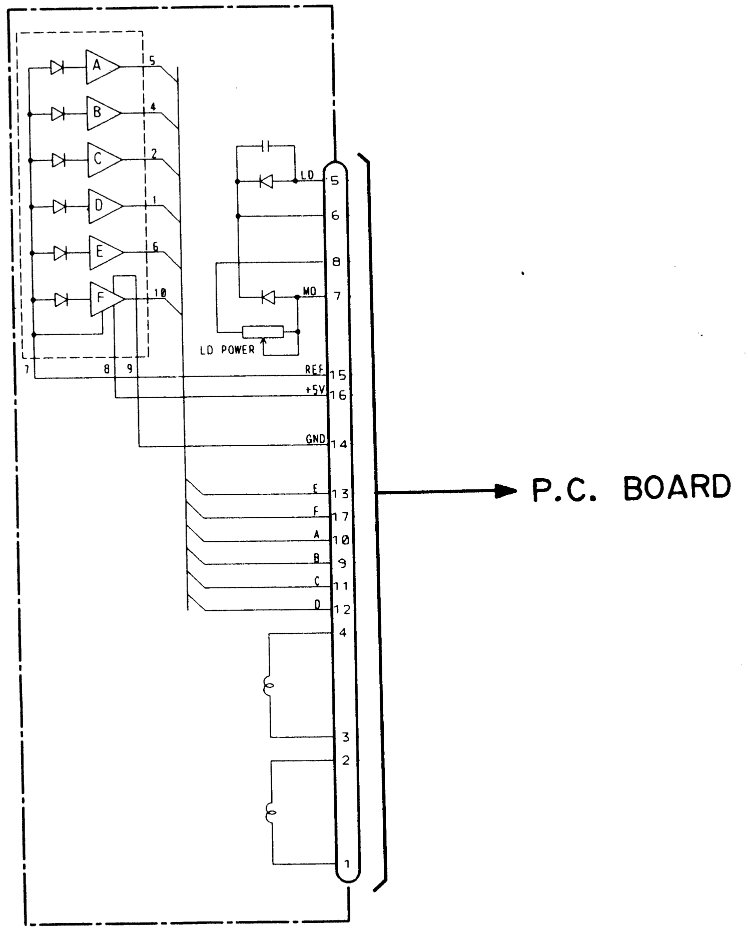


④ CH1: TEY 0.5V/div.
⑤ CH2: TIN 0.5V/div. 1ms/div.
Normal mode: During AGC

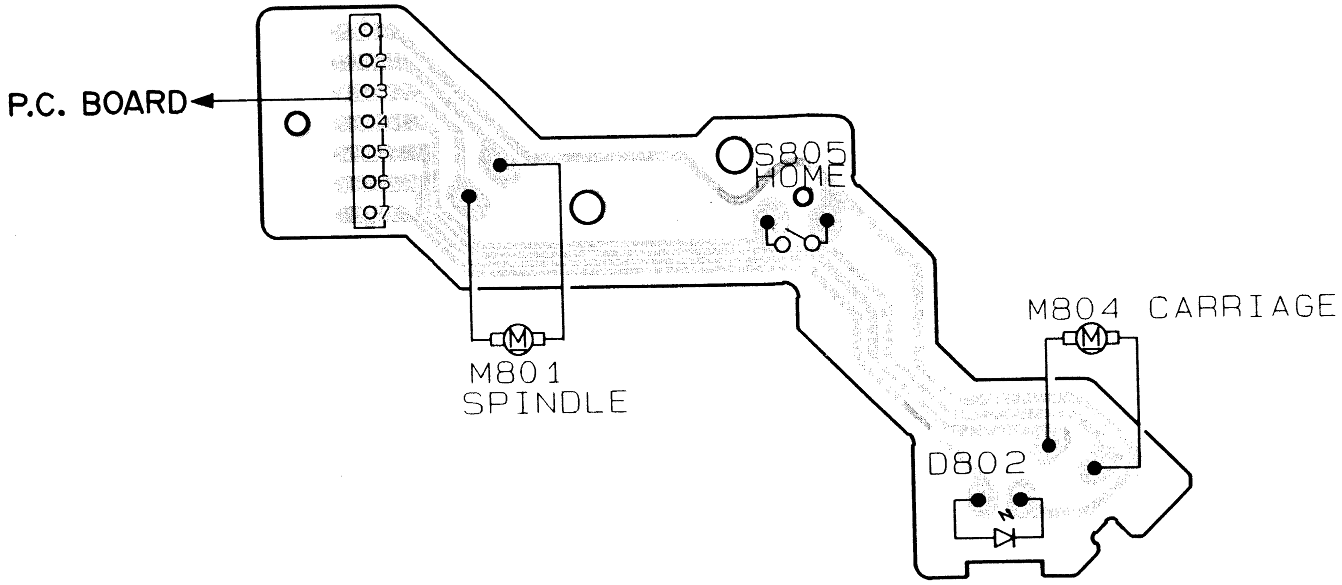


3. CONNECTION DIAGRAM(1)

PU UNIT


A
B
C
D
E
F
LD
MD
LD POWER
REF
+5V
GND
5
6
8
7
15
16
14
13
17
10
9
11
12
4
3
2
1
P.C. BOARD

MECHANISM P.C.BOARD


P.C. BOARD
1
2
3
4
5
6
7
S805
HOME
M801
SPINDLE
M804 CARRIAGE
D802

P.C.BOARD

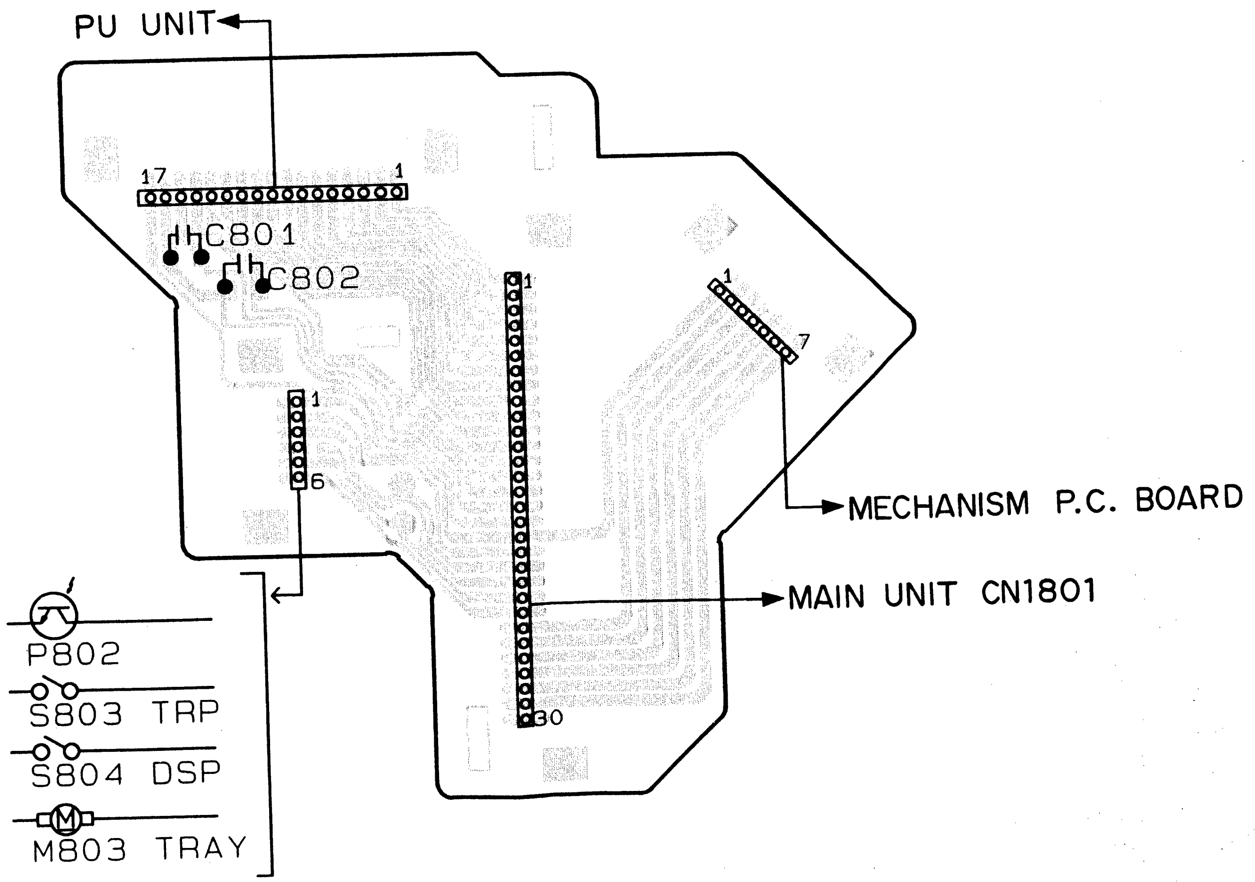
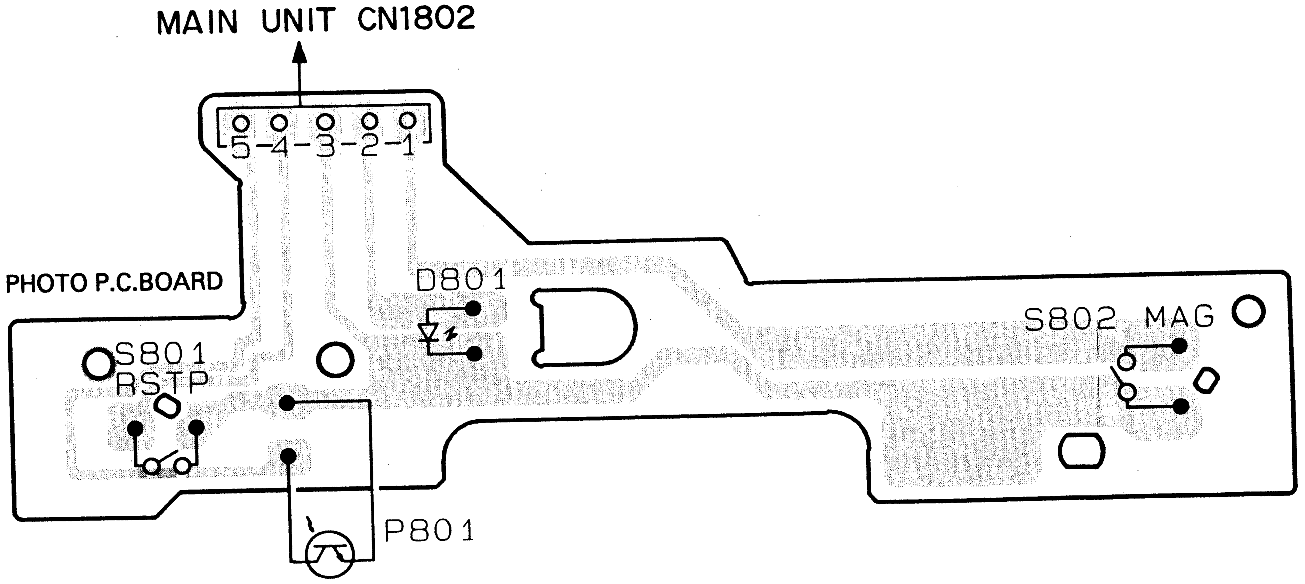

PU UNIT
17
1
C801
C802
1
6
1
30
1
7
MECHANISM P.C. BOARD
MAIN UNIT CN1801
P802
S803 TRP
S804 DSP
M803 TRAY

PHOTO P.C.BOARD


MAIN UNIT CN1802
5
4
3
2
1
D801
S801
RSTP
P801
S802 MAG

AGE

IC, Q	ADJ
IC1801 Q1801	VR1001 VR1002 VR1003 VR1004
Q1802 IC1702	
Q1701	
IC1001	
IC1201 IC1701	
Q1001	
IC1703	
IC1601 IC1603 Q1703	
Q1708 Q1704	
Q1707	
IC1401 IC1301 Q1709	
IC1602	
IC1704	
Q1401	

ISM P.C. BOARD

CN1801

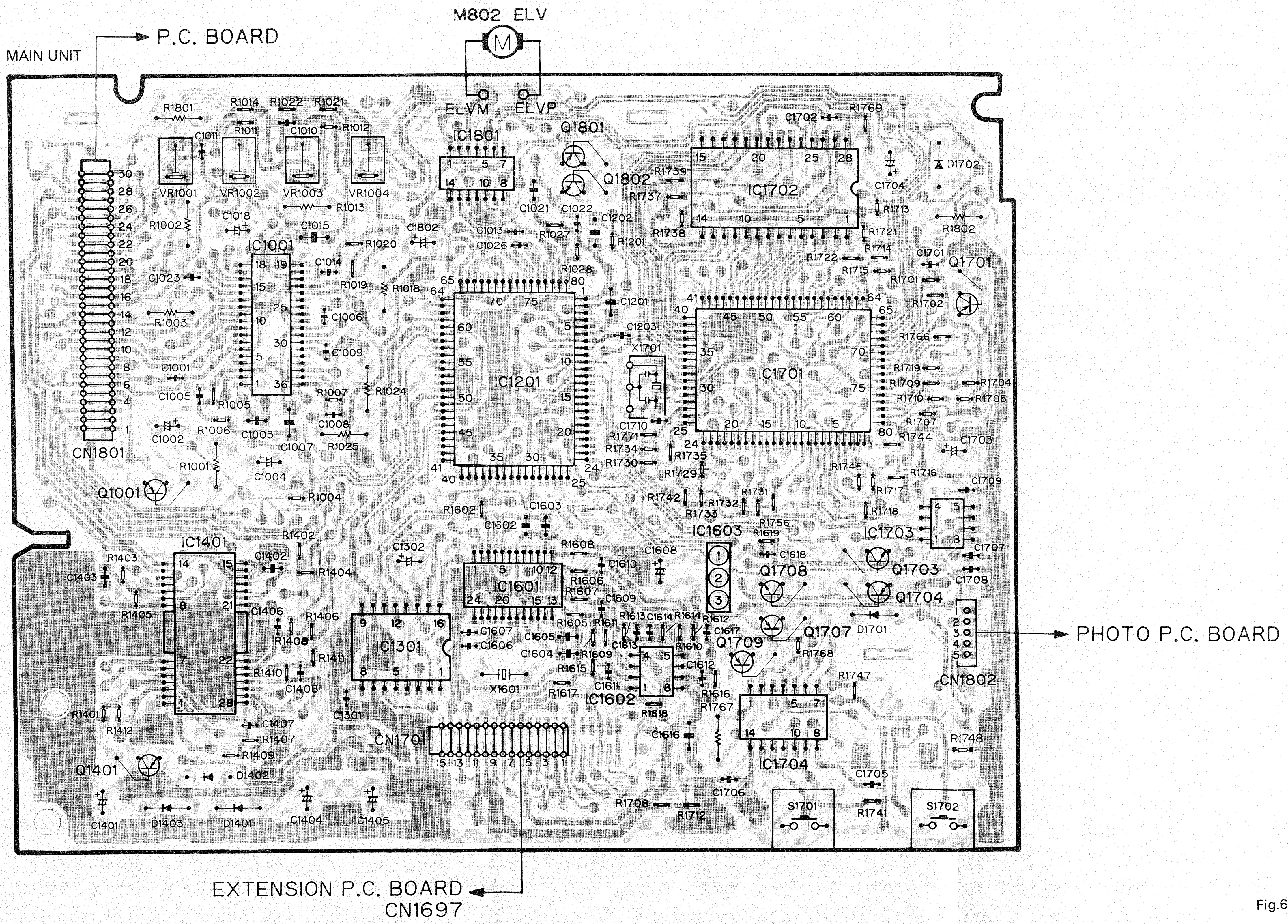
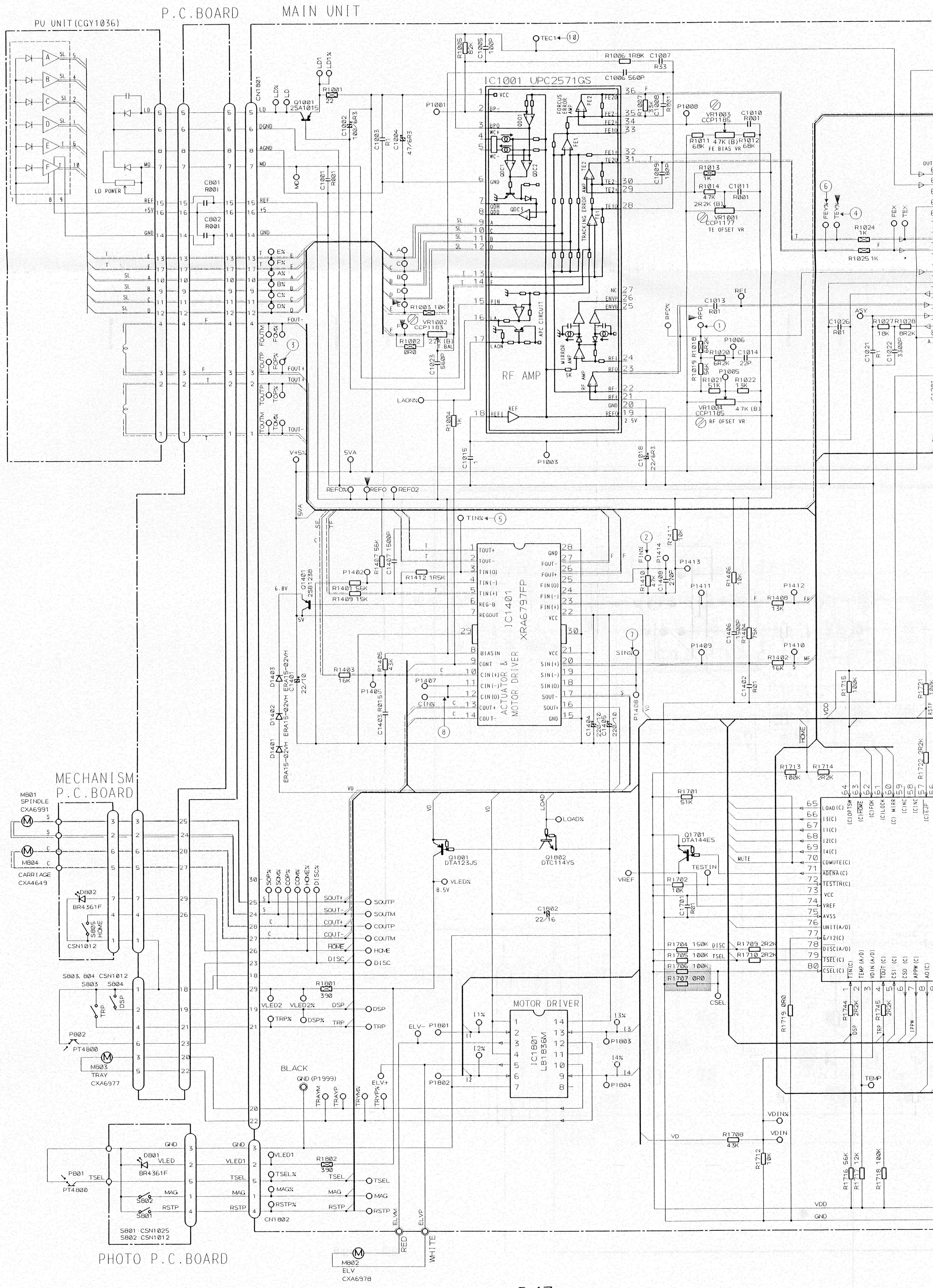

MAIN UNIT
P.C. BOARD
M802 ELV
M
ELVM
ELVP
IC1801
Q1801
Q1802
IC1702
D1702
R1802
Q1701
IC1701
IC1201
X1701
IC1001
VR1001
VR1002
VR1003
VR1004
CN1801
Q1001
IC1401
IC1301
IC1601
IC1603
IC1602
IC1703
Q1703
Q1704
Q1708
Q1707
Q1709
D1701
IC1704
CN1701
CN1802
X1601
Q1401
D1401
D1402
D1403
S1701
S1702
PHOTO P.C. BOARD
EXTENSION P.C. BOARD
CN1697

Fig.6

4. SCHEMATIC CIRCUIT DIAGRAM(1)

SL — SIGNAL LINE
F — FOCUS SERVO LINE
T — TRACKING SERVO LINE
C — CARRIAGE SERVO LINE
S — SPINDLE SERVO LINE



P.C.BOARD
MAIN UNIT
PU UNIT(CGY1036)
LD POWER
CN1801
IC1001 UPC2571GS
FOCUS ERROR AMP
TRACKING ERROR AMP
APC CIRCUIT
MIRROR AMP
RF AMP
Q1001 2SA1015
VR1003 CCP1185 FE BIAS VR
VR1001 CCP1177 TE OFSET VR
VR1002 CCP1183 T.BAL
VR1004 CCP1185 RF OFSET VR
IC1401 XRA6797FP
ACTUATOR & MOTOR DRIVER
Q1401 2SB1238
D1401 ERA15-02VH
D1402 ERA15-02VH
D1403 ERA15-02VH
MECHANISM P.C.BOARD
M801 SPINDLE CXA6991
M804 CARRIAGE CXA4649
D802 BR4361F
S805 HOME
CSN1012
S803, 804 CSN1012
S803 TRP
S804 DSP
P802 PT4800
M803 TRAY CXA6977
Q1801 DTA123JS
Q1802 DTC114YS
VLED% 8.5V
MOTOR DRIVER
IC1801 LB1836M
BLACK
GND (P1999)
PHOTO P.C.BOARD
D801 BR4361F
P801 PT4800
S801: CSN1025
S802: CSN1012
CN1802
M802 ELV CXA6978
RED
WHITE
Q1701 DTA144ES
TESTIN
MUTE
VREF
CSEL
TEMP
VDIN
VDD
GND

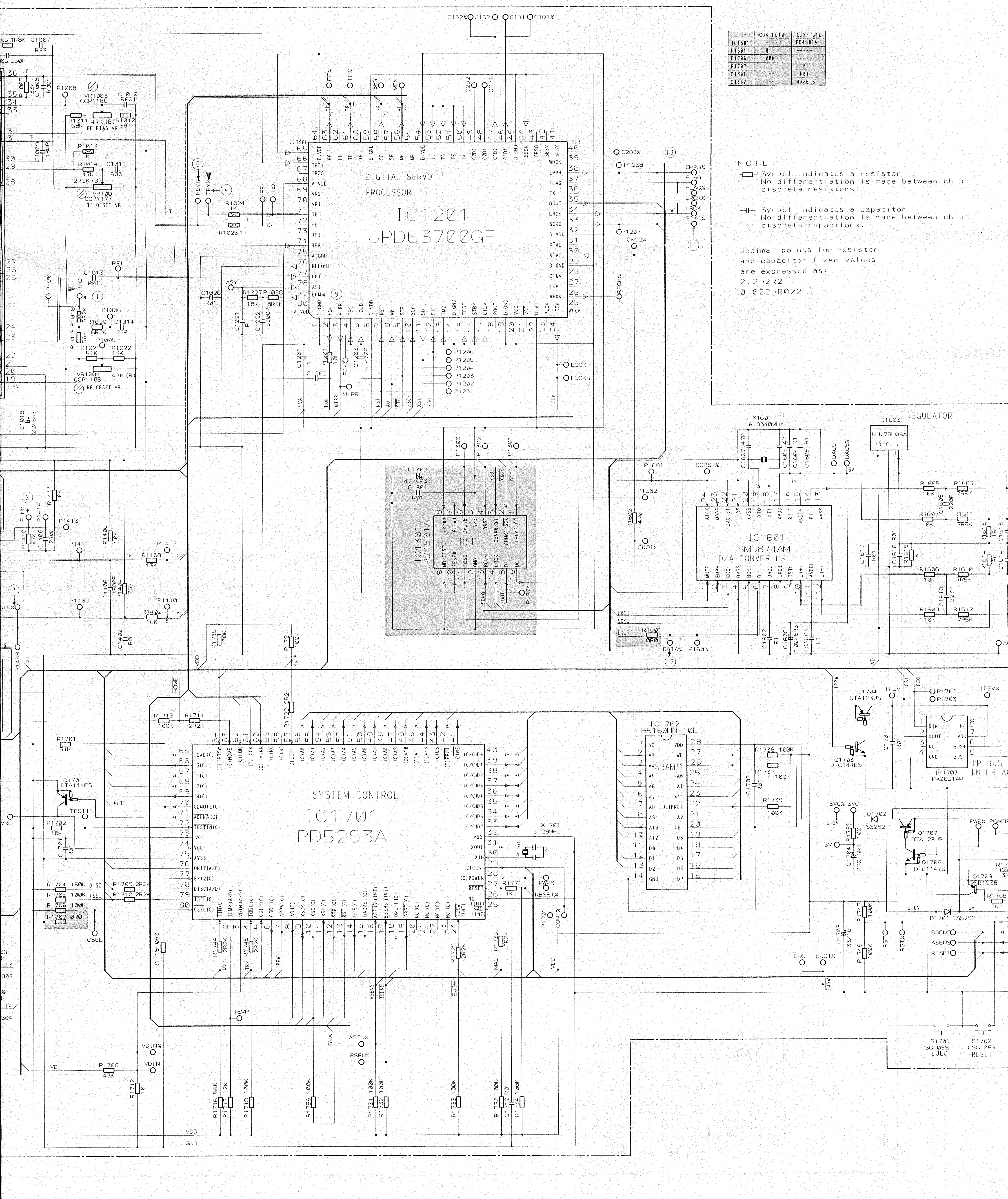
	CDX-P610	CDX-P616
IC1301	-----	PD4501A
R1601	0	-----
R1706	100K	-----
R1707	-----	0
C1301	-----	R01
C1302	-----	47/6R3

NOTE:

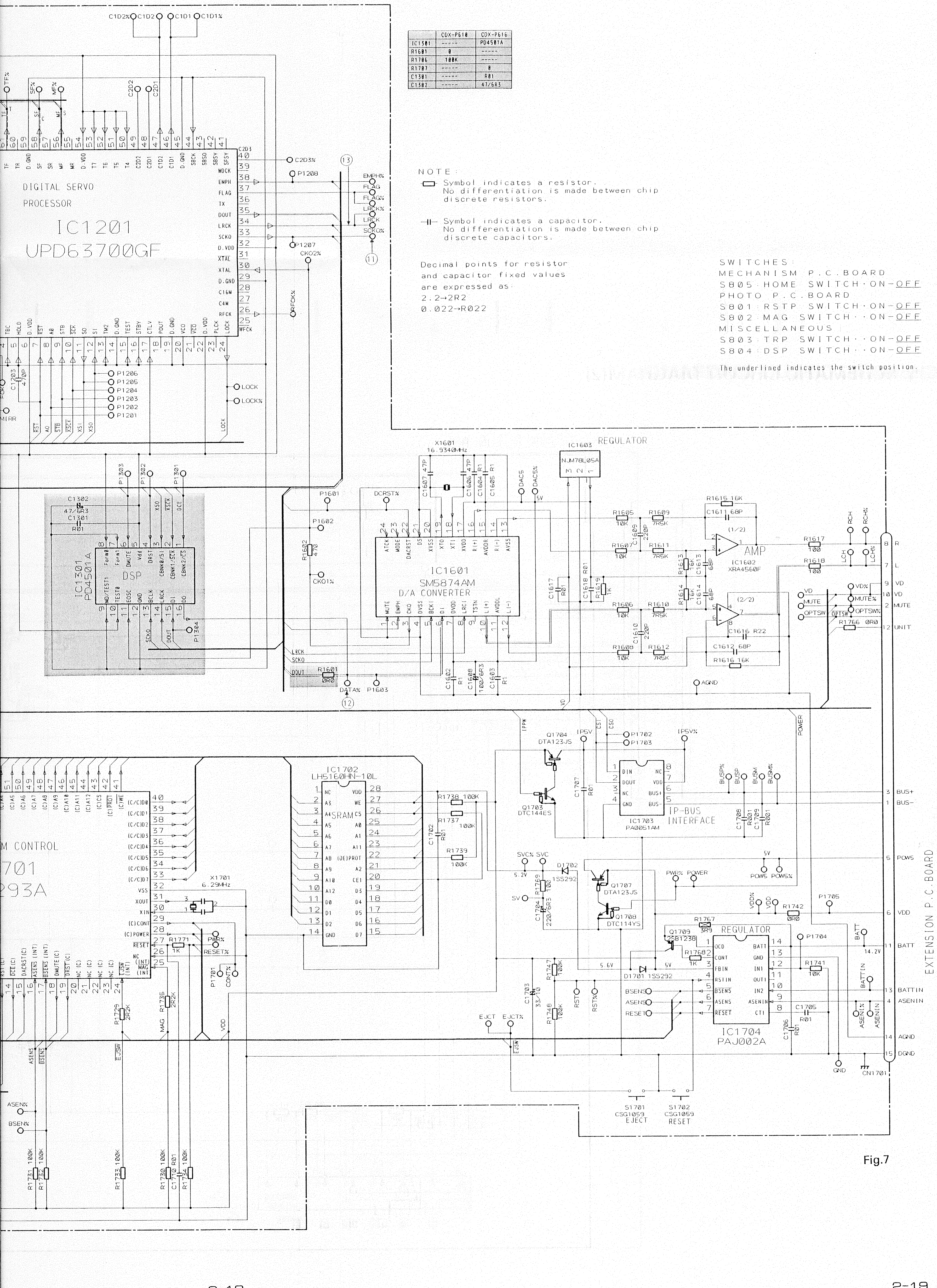
▭ Symbol indicates a resistor. No differentiation is made between chip discrete resistors.

⊣⊢ Symbol indicates a capacitor. No differentiation is made between chip discrete capacitors.

Decimal points for resistor and capacitor fixed values are expressed as:
2.2→2R2
0.022→R022


DIGITAL SERVO PROCESSOR
IC1201
UPD63700GF
IC1301
PD4501A
DSP
IC1601
SM5874AM
D/A CONVERTER
IC1603
NJM78L05A
REGULATOR
X1601
16.9340MHz
SYSTEM CONTROL
IC1701
PD5293A
X1701
6.29MHz
IC1702
LH5160HN-10L
SRAM
IC1703
PA0051AM
IP-BUS INTERFACE
Q1701
DTA144ES
Q1703
DTC144ES
Q1704
DTA123JS
Q1707
DTA123JS
Q1708
DTC114YS
Q1709
2SB1238
D1701 1SS292
D1702
1SS292
VR1003
CCP1185
FE BIAS VR
VR1001
CCP1177
TE OFSET VR
VR1004
CCP1185
RF OFSET VR
S1701
CSG1059
EJECT
S1702
CSG1059
RESET
C1D2%
C1D2
C1D1
C1D1%
LOCK
LOCK%
EMPH%
FLAG
FLAG%
LRCK%
LRCK
SCKO%
VDD
GND

4 5 6 7 8


DIGITAL SERVO PROCESSOR
IC1201
UPD63700GF
IC1301
PD4501A
DSP
IC1601
SM5874AM
D/A CONVERTER
X1601
16.9344MHz
IC1603
NJM78L05A
REGULATOR
IC1602
XRA4560F
AMP
IC1702
LH5160HN-10L
SRAM
M CONTROL
701
293A
X1701
6.29MHz
IC1703
PA0051AM
IP-BUS
INTERFACE
Q1704
DTA123JS
Q1703
DTC144ES
Q1707
DTA123JS
Q1708
DTC114YS
Q1709
2SB1238
D1701 1SS292
D1702
1SS292
IC1704
PAJ002A
REGULATOR
S1701
CSG1059
EJECT
S1702
CSG1059
RESET
EXTENSION P.C.BOARD
CN1697
CN1701
R
L
VD
MUTE
UNIT
BUS+
BUS-
POWS
VDD
BATT
BATTIN
ASENIN
AGND
DGND
14.2V
A
B
C
D
E
F
6
7
8
9

	CDX-P610	CDX-P616
IC1301	-----	PD4501A
R1601	0	-----
R1706	100K	-----
R1707	-----	0
C1301	-----	R01
C1302	-----	47/6R3

NOTE:

▭ Symbol indicates a resistor.
No differentiation is made between chip discrete resistors.

⊣⊢ Symbol indicates a capacitor.
No differentiation is made between chip discrete capacitors.

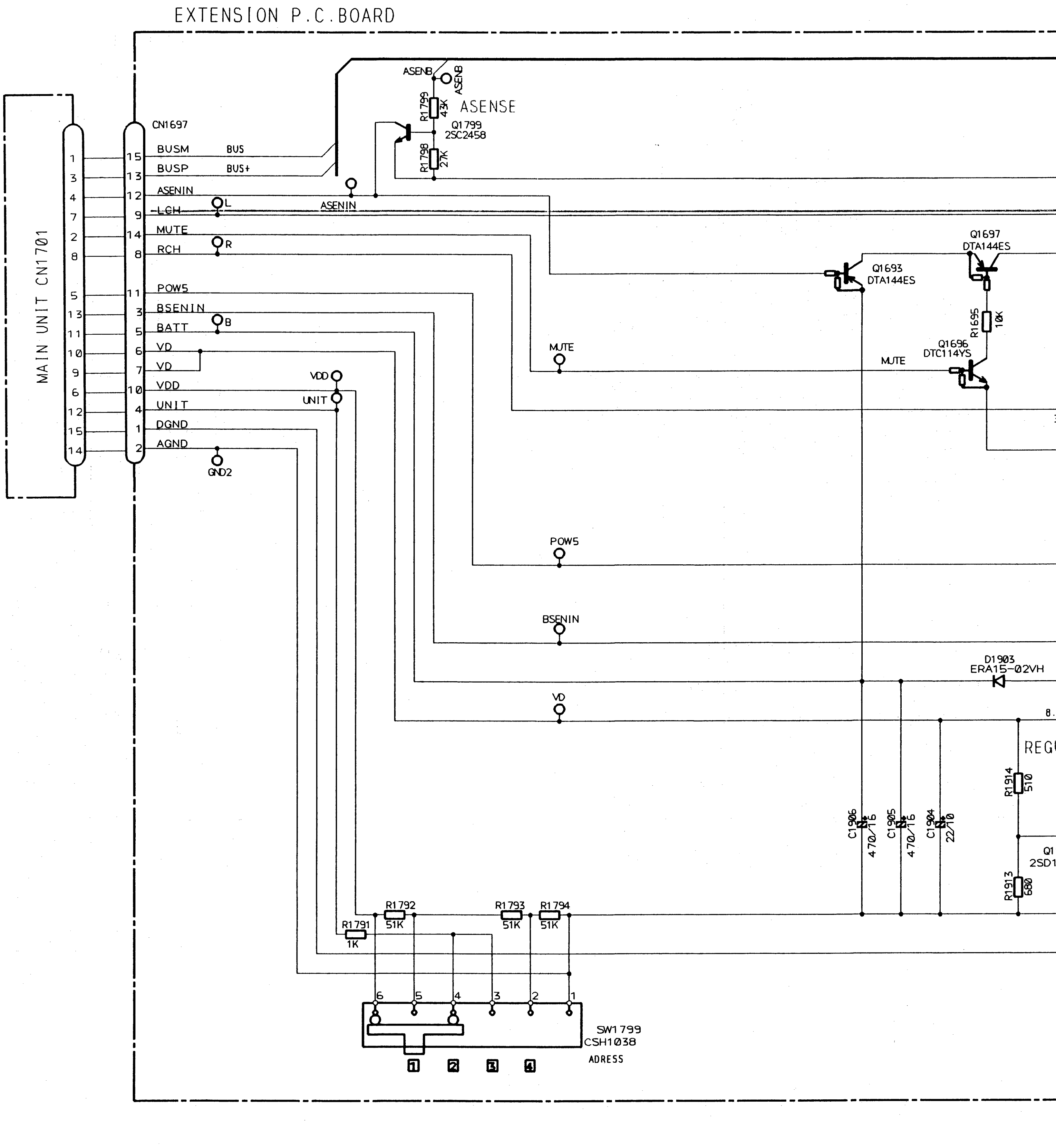
Decimal points for resistor and capacitor fixed values are expressed as:
2.2→2R2
0.022→R022

SWITCHES:
MECHANISM P.C.BOARD
S805: HOME SWITCH: ON-OFF
PHOTO P.C.BOARD
S801: RSTP SWITCH: ON-OFF
S802: MAG SWITCH: ON-OFF
MISCELLANEOUS
S803: TRP SWITCH: ON-OFF
S804: DSP SWITCH: ON-OFF

The underlined indicates the switch position.

Fig.7

5. SCHEMATIC CIRCUIT DIAGRAM(2)


EXTENSION P.C.BOARD
MAIN UNIT CN1701
CN1697
BUSM
BUSP
BUS
BUS+
ASENIN
LCH
MUTE
RCH
POW5
BSENIN
BATT
VD
VDD
UNIT
DGND
AGND
L
R
B
GND2
ASENB
R1799
43K
ASENSE
Q1799
2SC2458
R1798
27K
VDD
UNIT
MUTE
POW5
BSENIN
VD
Q1693
DTA144ES
Q1697
DTA144ES
R1695
10K
Q1696
DTC114YS
D1903
ERA15-02VH
REG
R1914
510
R1913
680
C1906
470/16
C1905
470/16
C1904
22/10
R1791
1K
R1792
51K
R1793
51K
R1794
51K
SW1799
CSH1038
ADRESS

4 5 6 7 8

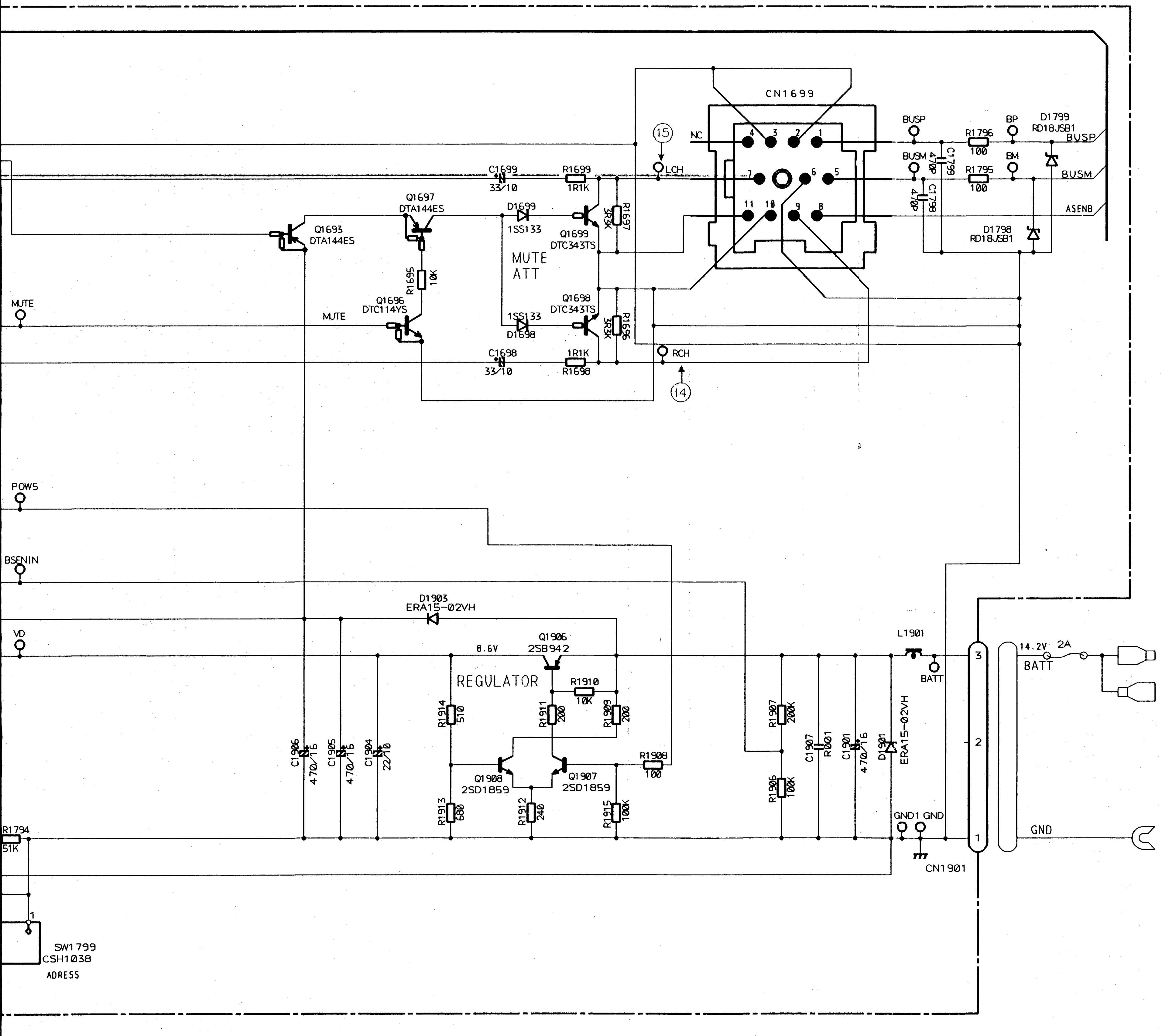

CN1699
NC
4
3
2
1
7
6
5
11
10
9
8
(15)
LCH
RCH
(14)
BUSP
BUSM
BP
BM
R1796
100
R1795
100
C1799
470P
C1798
470P
D1799
RD18JSB1
D1798
RD18JSB1
BUSP
BUSM
ASENB
C1699
33/10
R1699
1R1K
R1697
3R3K
D1699
1SS133
Q1699
DTC343TS
Q1697
DTA144ES
Q1693
DTA144ES
MUTE
ATT
R1695
10K
Q1696
DTC114YS
MUTE
MUTE
Q1698
DTC343TS
1SS133
D1698
R1696
3R3K
C1698
33/10
1R1K
R1698
POW5
BSENIN
VD
D1903
ERA15-02VH
Q1906
2SB942
8.6V
REGULATOR
R1910
10K
R1914
510
R1911
200
R1909
200
C1906
470/16
C1905
470/16
C1904
22/10
Q1908
2SD1859
Q1907
2SD1859
R1908
100
R1913
680
R1912
240
R1915
100K
R1794
51K
1
SW1799
CSH1038
ADRESS
R1907
200K
R1906
100K
C1907
R001
C1901
470/16
D1901
ERA15-02VH
L1901
BATT
GND1
GND
CN1901
3
2
1
14.2V
2A
BATT
GND

Fig.8

4 5 6 7 8

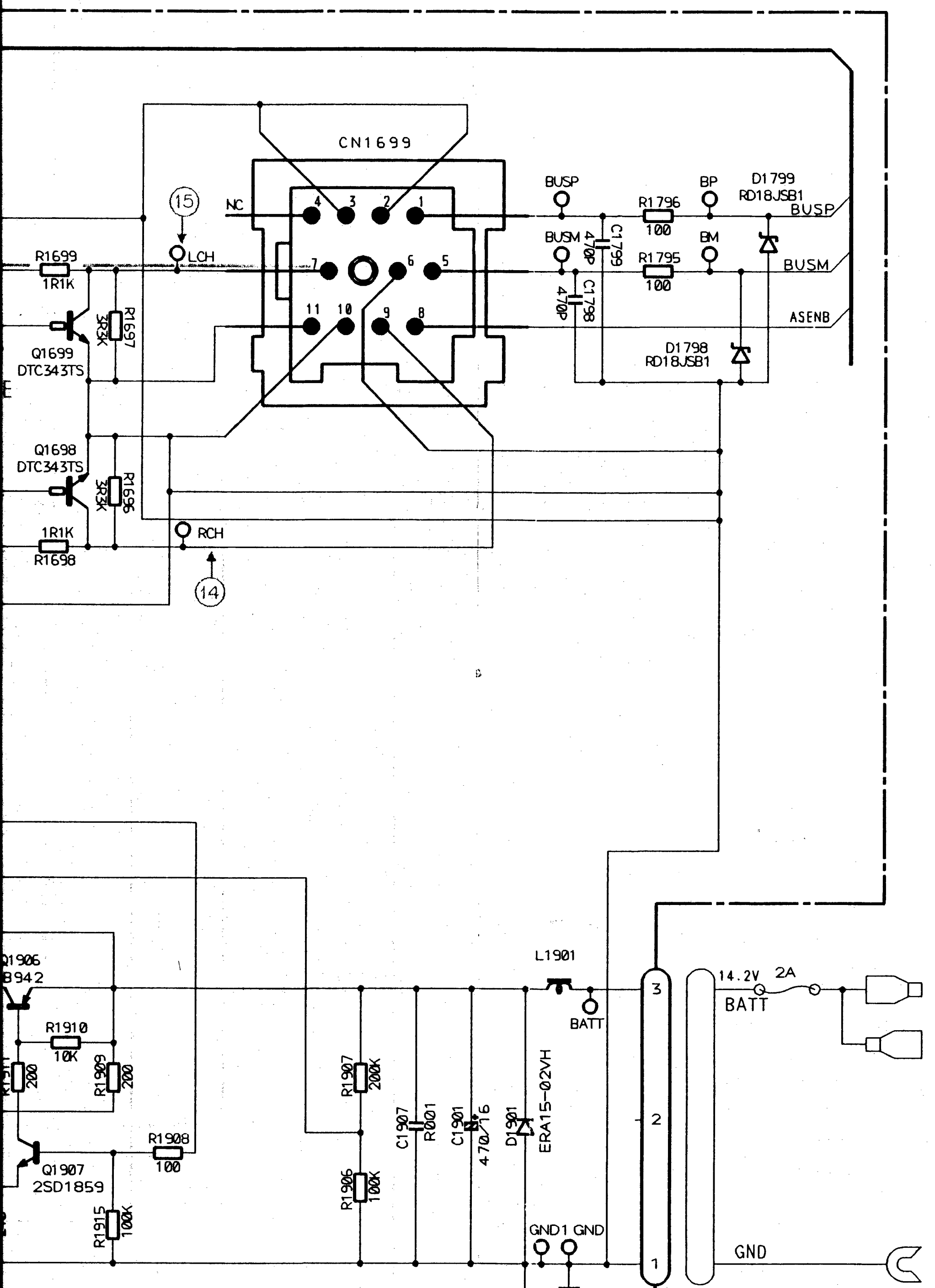

6
7
8
9
A
B
C
D
CN1699
NC
4
3
2
1
7
6
5
11
10
9
8
15
LCH
R1699
1R1K
R1697
3R3K
Q1699
DTC343TS
Q1698
DTC343TS
R1696
3R3K
1R1K
R1698
RCH
14
BUSP
BUSM
C1799
470P
C1798
470P
R1796
100
R1795
100
BP
BM
D1799
RD18JSB1
D1798
RD18JSB1
BUSP
BUSM
ASENB
Q1906
B942
R1910
10K
R1909
200
200
Q1907
2SD1859
R1908
100
R1915
100K
R1907
200K
R1906
100K
C1907
R001
C1901
470/16
D1901
ERA15-02VH
L1901
BATT
GND1
GND
CN1901
3
2
1
14.2V
2A
BATT
GND

Fig.8

6. CONNECTION DIAGRAM(2)

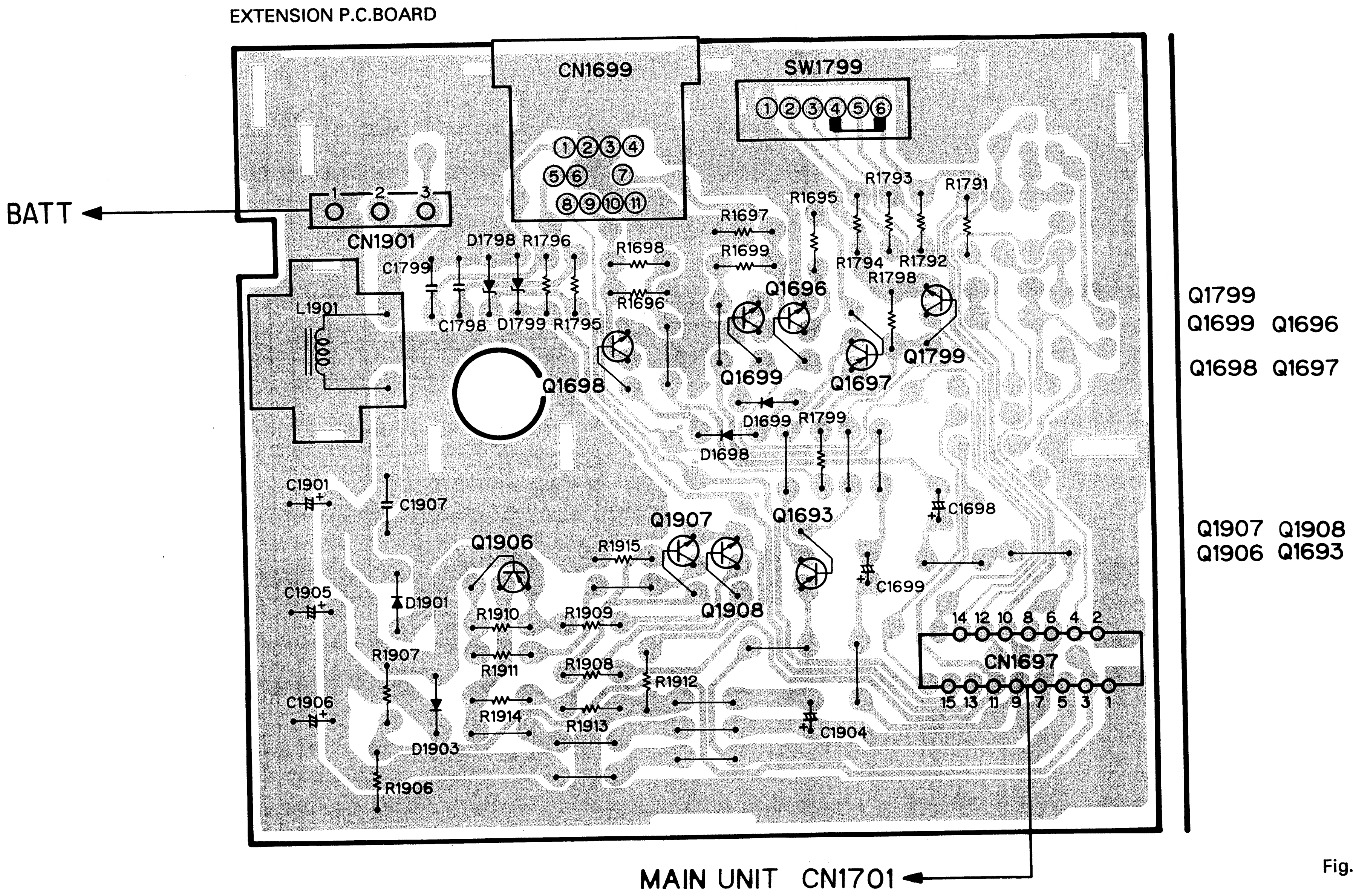

EXTENSION P.C.BOARD
CN1699
SW1799
BATT
CN1901
L1901
C1799
C1798
D1798
D1799
R1796
R1795
R1698
R1696
R1697
R1699
R1695
R1793
R1791
R1794
R1792
R1798
Q1698
Q1696
Q1699
Q1697
Q1799
D1699
R1799
D1698
C1698
C1699
Q1693
C1901
C1907
C1905
C1906
D1901
R1907
D1903
R1906
Q1906
R1910
R1911
R1914
R1915
R1909
R1908
R1913
R1912
Q1907
Q1908
C1904
CN1697
14 12 10 8 6 4 2
15 13 11 9 7 5 3 1
Q1799
Q1699 Q1696
Q1698 Q1697
Q1907 Q1908
Q1906 Q1693
MAIN UNIT CN1701

Fig.9

7. BLOCK DIAGRAM

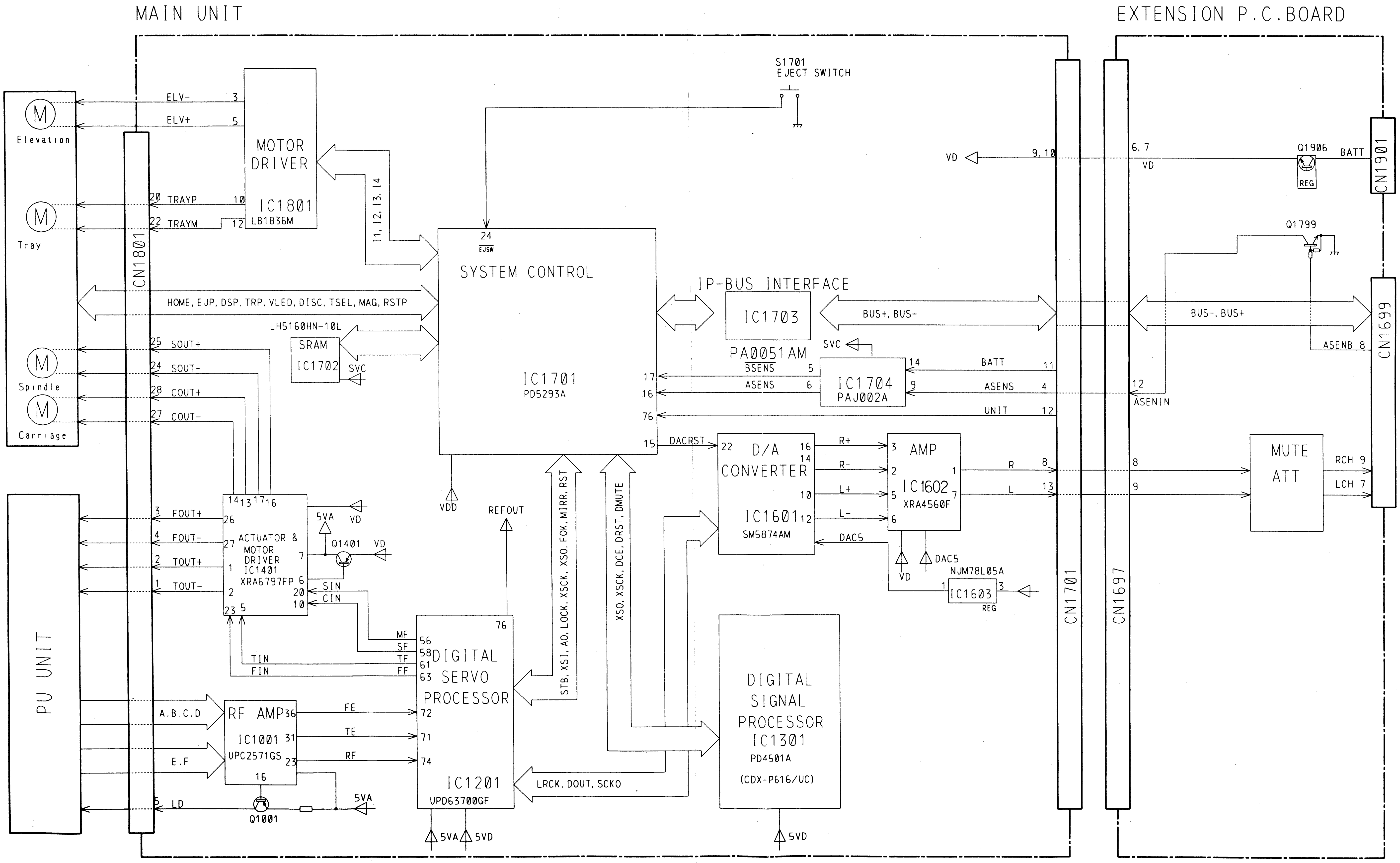

MAIN UNIT
EXTENSION P.C.BOARD
M Elevation
M Tray
M Spindle
M Carriage
PU UNIT
CN1801
ELV- 3
ELV+ 5
MOTOR DRIVER
IC1801
LB1836M
20 TRAYP 10
22 TRAYM 12
I1, I2, I3, I4
S1701
EJECT SWITCH
24
EJSW
SYSTEM CONTROL
IC1701
PD5293A
HOME, EJP, DSP, TRP, VLED, DISC, TSEL, MAG, RSTP
LH5160HN-10L
SRAM
IC1702
SVC
IP-BUS INTERFACE
IC1703
PA0051AM
BUS+, BUS-
BUS-, BUS+
VD
9, 10
6, 7
VD
Q1906
REG
BATT
CN1901
Q1799
CN1699
ASENB 8
SVC
IC1704
PAJ002A
BSENS 5
ASENS 6
14 BATT 11
9 ASENS 4
12
ASENIN
UNIT 12
17
16
76
15 DACRST
22 D/A CONVERTER
IC1601
SM5874AM
16 R+
14 R-
10 L+
12 L-
DAC5
3 AMP
2
5
6
IC1602
XRA4560F
1 R 8
7 L 13
8
9
MUTE ATT
RCH 9
LCH 7
VD
DAC5
NJM78L05A
IC1603
REG
1
3
CN1701
CN1697
25 SOUT+
24 SOUT-
28 COUT+
27 COUT-
3 FOUT+ 26
4 FOUT- 27
2 TOUT+ 1
1 TOUT- 2
14 13 17 16
ACTUATOR & MOTOR DRIVER
IC1401
XRA6797FP
5VA
VD
Q1401
VD
7
6 SIN 20
CIN 10
23 5
TIN
FIN
VDD
REFOUT
STB, XSI, AO, LOCK, XSCK, XSO, FOK, MIRR, RST
XSO, XSCK, DCE, DRST, DMUTE
MF 56
SF 58
TF 61
FF 63
76
DIGITAL SERVO PROCESSOR
IC1201
UPD63700GF
A.B.C.D
E.F
RF AMP
IC1001
UPC2571GS
36 FE 72
31 TE 71
23 RF 74
16
5 LD
Q1001
5VA
LRCK, DOUT, SCKO
5VA
5VD
DIGITAL SIGNAL PROCESSOR
IC1301
PD4501A
(CDX-P616/UC)
5VD

Fig.10